

establishing a technical school in the name of the 'Prince of Wales' at Jorhat. The institute was founded the following year on 16 January 1928. A four-year certificate course in civil engineering was introduced in 1948. Since 1957, three-year diploma courses have been introduced in the Electrical and Mechanical Engineering Departments in addition to the Civil Engineering Department. In 1976 & 1978 respectively, courses in Automotive and Agricultural Engineering began. Electronic & telecommunications engineering and instrumentation technology programs were later introduced in 1986. The Institution was known as the 'War Technical School' during the time of the Second World War.

General Colleges

The four general colleges, namely Jagannath Barooah (J.B.) College, Jorhat College and Devi Charan Barooah (D.C.B.) Girls' College, Chadra Kammal Barooah (C.K.B.) Commerce College are located within the municipal limit and three other general colleges namely Jorhat Kendriya Mahavidyalaya located in 2 no. Bamun Gaon, Cinnamara College located in Cinnamara Grant (OG), and Bahona College are located within GJRM area and outside municipal limit. The colleges impart education mainly up to graduate level in Arts, Science and Commerce stream and in Jagannath Barooah (J.B.) College, Post-Graduation courses are also available in few subjects.

B.Ed College

There are two nos. of B. Ed. Colleges in GJRM area. One is located in heart of the city, namely P.G. Teacher Training College and the other is located in Tarajan, namely Kamala Bezbaruah Memorial College of Teachers Education.

Engineering College

There are two no. of Engineering Colleges in GJRM area. One is located in Dulia Gaon, namely Jorhat Engineering College and the other is located in Gharpholia Gaon, namely Jorhat Institute of Science & Technology. Jorhat Engineering College offers Post graduate courses in



Fig. 6.3 Jorhat Engineering College (Source: My Study India)

some subjects and MCA. The both engineering colleges are now affiliated to Assam Science and Technology University.

Medical Education

Jorhat Medical College & Hospital (JMCH), the fourth medical college of the state, is located in Sonari Gaon about 3 km west from the heart of the Jorhat city. The college offers MBBS courses and Post Graduate Courses in General Medicine, General Surgery, Orthopedics, Paediatrics, Radiology, Anaesthesia, ENT, Ophthalmology & Non clinical departments. Dr.J.K. Saikia Homeopathic Medical College under Govt. of Assam is located at Club road, Bongal Pukuri within GJRMP area. School of Nursing, Jorhat Medical College Hospital, Jorhat which is approved by Indian Nursing Council offers Nursing Courses as well as Institute of Paramedical Sciences, Jorhat Medical College offers paramedical courses in Medical Laboratory Technology, Medical Radiographic Technology, Cardiac Care Technology, Physiotherapy, ICU Technology, Physician's Assistant Course, Emergency and First Aid, OT Technology (OT+Anaesthesia+Endoscopy), Dialysis Technician Course. The Medical Institute, Jorhat (MIJ) (also known as Jorhat Medical Institute) is an institution imparting medical education, located at Barbheta, within GJRMP area and it trains Rural Health Practitioners (RHP) and nowadays placed as Community Health officer under NHM, who serve as a medical professional in the rural areas at Sub center & PHC level. This course is known as Diploma in Medicine and Rural Health Care (DMRHC). DMRHC is a three and half year's medical course, now known as B.Sc. Family and Community Health.

National Institute of Design

The National Institute of Design (NID), Assam is an autonomous Institution of National Importance under Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India established at Jorhat through the NID (Amendment) Act, 2019 passed by the Parliament of India. It is an Institution established to provide Design Education and has the mandate to award the Bachelor's degree in Design (B.Des). NID Assam's presence in Jorhat gives a great opportunity to young creative talent and design aspirants from North East India and across the country. The institute offers three main courses,



Fig. 6.4 National Institute of Design, Jorhat (Source: eMango)

Textile and Apparel design, communication design and industrial designs all of which follow the two semester per year pattern.

Assam Agricultural University

Assam Agricultural University (AAU) is a state agricultural university and established in the year 1969, having colleges in all over the state of Assam, headquartered at Borbheta, within GJRMP area. AAU offers UG, PG, as well as Doctoral studies through its various faculties:

- i) Faculty of Agriculture - B.Sc. (Hons.) & M.Sc. in Agriculture, M.Sc. in Food Technology, MBA in Agri Business, Ph. D. in Agriculture.
- ii) Faculty of Community Science - B.Sc. (Hons.) in Community Science as well as in Food Nutrition & Dietetics, M.Sc. in Home Science & Ph. D.
- iii) Faculty of Horticulture - B.Sc. (Hons.) in Basic Science, Floriculture & Landscape Architecture, Fruit Science, Natural Resource Management, Plant Protection, Post-Harvest Technology, Social Science, and Vegetable Science.
- iv) Faculty of Sericulture - B.Sc. (Hons.) in Agriculture & Allied Subjects, Basic Sciences & Humanities, Cocoon Crop Production, Host Plant Production, Sericulture Crop Improvement, Silk Production Science in its Jorhat Campus.
- v) Jorhat Christian Medical Centre, Jorhat was established in the year 1924, and affiliated to Assam Agricultural University, Jorhat offers Full Time Professional Courses in Certificate Course in General Nursing and Midwifery (GNM) of Duration: 3 years 6 month and in Diploma General Nursing (DGN) of duration 1 year.

Assam Women's University

The Assam Women's University was set up as the state university through the act XXII of 2013. The university is located in the Hazari Gaon within GJRMP area. The Assam Women's University offers a several of courses in various streams; undergraduate courses like BA, Bachelor in Physiotherapy and Post graduate courses like MA, MBA, MCA and MTM (Masters in Tourism Management)

Table 6.16 List of Higher Educational Institute in Jorhat

Sl. No	Name of the College	Stream	Status	Year of Establishment
1	Assam Agricultural University (AAU)	B. Sc. & M. Sc. (Agriculture), (Home Science), (Horticulture) (Sericulture) MBA in Agri-Business and Phd Courses	University	1969
2	Assam Women Univesity	MBA, MCA, MA etc.	University	2013

3	Jorhat Medical College	MBBS, PG	Affiliated to Srimanta Sankaradeva University of Health Sciences and approved by Medical Council of India	2009
	National Institute of Design, Jorhat	B.Des, M.Des	Autonomous National Institution	2019
4	Jorhat Engineering College	B.Tech., MCA, M.Tech.	Affiliated to Assam Science & Technology University approved by AICTE	1960
5	Jorhat Institute of Science & Technology	Electronics and Telecommunication Engineering, Power Electronics and Instrumentation, BSC	Affiliated to Assam Science & Technology University approved by AICTE	1971
6	Prince of Wales Institute of Engineering and Technology	Diploma Courses on Engineering	Affiliated to State Council for Technical Education, Assam	1927
7	Industrial Training Institute, Jorhat	Certificate Courses	Affiliated to NCVT	1947
8	Kaziranga University, Karaikhowa (<i>Outside Planning Area</i>)	B.Tech., B.Sc., M.Sc., BBA, MBA and Phd Courses	Private University	2013
9	Dr. J K Saikia Homeopathic Medical College	Bachelor of Homeopathic Medicine and Surgery	Affiliated to Srimanta Sankaradeva University of Health Sciences	1975
10	Jorhat Law College	LLB, BA LLB(Hons.), LLM, (Permitted)	Permanent Affiliation	1964
11	P.G.T College	B.Ed.	Govt. College	1957
12	Kamala Bezbaruah Memorial College of Teachers Education	B.Ed.	Permanent Affiliation	1990
13	Jagannath Barooah College	B.A., B.Com., B.Sc., BBA, BCA and PG Programme in few selected courses.	Autonomous	1930

14	D.C.B. Girls' College	B.A., B.Sc.,	Affiliated to Dibrugarh University	1955
15	Chandra Kamal Bezbaruah Commerce College	B. Com	Affiliated to Dibrugarh University	1965
16	Jorhat College (Amalgamated)	B.A.	Affiliated to Dibrugarh University	1984
17	Jorhat Kendriya Mahavidyalaya	B.A., B.Sc.	Permanent Affiliation	1981
18	Bahona College	B.A., B.Sc., B.Ed.	Affiliated to Dibrugarh University	1966
19	Cinnamara College	B.A.	Affiliated to Dibrugarh University	1991
20	National Institute of Electronics & Information Technology	Short Term Certificate Courses	Autonomous National Institution	2013
21	BOSCO Institute	MSW	Permitted	2008
22	North East Institute of Management Science	B. Hotel Management	Permitted	2000
23	Global Engineering Academy	PGDCA	Permitted	2006
24	Asom Sattriya Sangit Mahavidyalaya	Sangeet and Dance	Permitted	1998
25	Eastern Theological College	Bachelor of Divinity [B.Div] Bachelor of Christian Studies Master of Theology [M.Th]	Senate of Serampore college University (Private)	1906

Source: Field Survey, T&CP, Jorhat

6.2.1.3 Research Institutes

There are many Research Institutions within GJRMP area including the prominent CSIR - North East Institute of Science and Technology (NEIST), the Tocklai Tea Research Institute. Details of some research institutes in the planning area is given below:

CSIR - North East Institute of Science and Technology

The CSIR- North East Institute of Science and Technology, formerly known as Regional Research Laboratory, Jorhat was established in the year 1961 as one of the multidisciplinary laboratories of Council of Scientific & Industrial Research (CSIR) under its Chemical Science Group of laboratories and has been engaged in multidisciplinary R&D work relevant to the country in general and North Eastern Region in particular. Its major thrust of R&D activities has been to develop indigenous technologies by utilizing the immense natural wealth of India.

The North Eastern Region of the country being bestowed with an abundance of material resources like petroleum, natural Gas, Minerals, Tea as well as aromatic and Medicinal plants and hence the laboratories were targeted to undertake research for development of knowhow for a wide a range of industries and extension works. Over the years, the laboratory has generated more than 100 technologies in the areas of Agro-technology, Biological and Oil Field Chemicals of which about 40% were of commercial success culminating in setting up of various industries throughout the country. The laboratory also developed expertise in the areas like Natural Products Chemistry, and drug intermediates, VSK cement, Plant Technology, Agro-technologies, Petroleum Microbiology and Petrochemicals, Crude oil transportation, Paper and Paper Products, beneficiation Chemicals, ecology and environmental studies, Geotechnical investigations, foundation design engineering, soil and building materials etc. The annual turn-over of the products produced with RRL technologies within the country is estimated to be ₹ 110 Crores.

Tocklai Tea Research Institute

Another premier Research Institution within GJRMP area is Tocklai Tea Research Institute, established in 1911, at a site near river Tocklai which is only the tea research institute in India. The formation of Tea Research Association (TRA) in 1964 under Ministry of commerce, Govt of India with Tocklai as centre for all activities further expended the horizon of tea research to cover the entire Northeast India. Research on all aspects of tea cultivation and processing Tocklai Tea Research Institute is the oldest and largest research institute of its kind in the world.

Other important Research institutions are as follows:

1. Central Silk Technological Research Institute (Demonstration Centre, under Central Silk Board) Industrial Estate Tinali, Jorhat-785008
2. Extension Education Institute (EEI) AAU, Jorhat-13, Assam funded by Directorate of Extension Education, Govt. of India, Ministry of Agriculture, New Delhi
3. Indian Grain Storage Management and Research Institute, Jorhat,
4. Indian Institute of Plantation Management (IIPM), Jorhat Centre, Under Min. of Commerce & Industry, Govt. of India
5. Institute of Biotechnology & Geotectonics Studies (INBGS), ONGC Complex, Cinnamara, Jorhat - 785008
6. National Bureau of Soil Survey & Land Use Planning (NBSSLUP), Regional Centre, Jamuguri Road, Jorhat-785004
7. Rain Forest Research Institute (RFRI), Jorhat under ICFE, Min. of Environment & Forests, Govt. of India
8. Regional Sericultural Research Stations (under Central Silk Board), Club Road Tinali, BongalPukhuri, Jorhat-785001



Fig. 6.5 CSIR-NEIST (Source: CSIR)

Media

The healthy education and cultural life of Jorhat can be best judged from the fact that the district has as many as five daily newspapers published from two publishing groups. The Janambhumi Group of Newspapers: The Saptahik Janambhumi, the Dainik Janambhumi, and the Eastern Clarion. The Spatahik Janambhumi celebrated its 50 years of circulation and the Dainik Janambhumi crossed its 48 years of existence. The G.L. Publication publishes three newspapers from Guwahati and Jorhat simultaneously. They are the North East Times (English), Amar Asom (Assamese), and the Purbanchal Prohori (Hindi). The other newspapers published from Jorhat are: Dainik Agradoot, Asomiya Khobor and Niyomiya Barta.

6.2.1.4 Estimation for Future Demand

Existing facilities show there is not much shortage in number of schools at any level. However, its spatial distribution is not convenient for people living in the rural areas. All the urban areas and villages within GJRMP area have Govt. Primary schools. Govt. Middle School, Govt. High Schools are located covering almost all the neighboring villages. Govt. Higher Secondary Schools are not found in villages of GJRMP area, the students have to come to Jorhat urban area. As per field survey it is found that only six nos. of villages within GJRMP area have all the educational institutions upto senior secondary level Porbotia Gaon, Ajan Bamun Gaon, Choudang Gaon No.2, Kamar Hazarika Gaon, No.1 Bamun Gaon and Aliamukhia Gaon.

The higher education facilities in the Master Plan Area are also adequate for the city level population, however there is no city or district level reservations in the colleges and technical institutes, and students from several nearby places and districts also comes to Jorhat for higher education.

On an average the shortage is not a quantitative one. But there is need for qualitative improvement of existing educational facilities especially at school level. For determining the future requirement for schools at higher levels, the existing numbers of higher secondary schools have only been considered and the requirement is calculated below as per the URDPFI Guidelines.

It is desirable that instead of creating new facilities, the focus should be on qualitative improvement by raising the standards of the existing facilities, capacity building and upgrading teaching standard.

The upgradation of existing senior secondary and higher secondary institutes is going on to meet the necessary qualifications of the National Education Policy which is being implemented by the Govt. This may create an imbalance as earlier most of colleges offered higher secondary

education, but due to the insufficient capacity and changing of the norms, higher secondary courses in colleges will be dropped out. Rise of institutes may be seen which will offer both Senior and Higher secondary education courses (Class 9 to Class 12).

6.2.2 Medical Facilities



Fig. 6.6 Jorhat Medical College and Hospital (Source: T&CP)

The existing health in the planning area include primary health centres, government and private hospitals, eye hospital, veterinary hospital, and nursing homes. These facilities have been set up by both public and private sector organizations. Jorhat Medical College and Hospital is the primary medical facility provider along with some specialized hospitals and nursing homes.

Jorhat Medical College and Hospital has 500 beds at present against 174 no. doctors. The Mission Hospital has 100 no. beds and 13 no. doctors. Jorhat. As per the population in the planning area in 2011, there is one bed for every 92 people. But Jorhat Medical College Hospital serves the entire population of Jorhat District and some patients of other neighboring districts like Golaghat, Sibsagar, Majuli and 'Nagaland' come to Jorhat for better treatment. However, 'beds' in the Nursing Homes may be viewed as special category only.

Table 6.17 Health Facilities in GJRMP area

Sl. No.	Type of facilities		Bed	Doctors	Visiting Doctors
1.	Govt. Hospital				
	i	Jorhat Medical College and Hospital	500	174	
	ii	Jorhat Cancer Centre	45	6	2
2.		Mission Hospital	100	13	
3.	Private Nursing Home				
	i	A G Nursing Home	37	10	
	ii	Sanjivani Hospital	65	22	6
	iii	Regional Diabetic & Research Centre	20	10	6
	iv	Baruah Surgical	34	15	3
	v	K G Memorial Nursing Home	30	14	
	vi	Niramoy Hospital	36	14	10
	vii	Chandraprava Eye Hospital	10	6	
	viii	Pain & Fracture	3	4	

4.	ix	Medicure (Malpani NH&RC)	29	10	6
	x	P B Polyclinic	7	6	3
	xi	M C W Centre	5	6	4
	xii	Lions Eye Hospital	64	4	
	xiii	Sanjivani Multispecialty Hospital	30	8	
	xiv	Satyam Hospital & Research Centre	30	18	16
	xv	City Orthopedic Hospital	33	10	
	xvi	Arunodoi Hospital	13	15	13
	xvii	Institute of Medical Science & Research	17	9	
	xviii	J N IOL and Contact lens Centre	4	4	2
	Govt. PHC, MPHC & Dispensary				
	i	Baghchung Primary Health Centre, 1 No. Chowdang Gaon			
	ii	Dahotia State Dispensary,			
5.	iii	Cenijan Mini PHC			
	iv	Kachogoral Mini Primary Health Centre, Dulia Pam Gaon			
	v	Jorhat MCW Centre, Jorhat Town			
	vi	BB Dispensary, Jorhat Town			
	vii	Nabora PHC, Dahikhor Gaon			
	Govt. Sub Centre				
	i	Rawriah SC			
	ii	Garmur SC, Kumar Kaiborta Gaon			
	iii	Karanga SC, Kamar Hazarika Gaon			
	iv	Kolakhowa SC, Kalakhowa Gaon			
	v	Pokimuri SC, Pokimuri Habi Gaon			
	vi	Bahona SC, Bahona			
	vii	Hatigarh SC, Hatigarh TE			
	viii	Gharpholia SC			
	ix	Desoinagar SC			
	x	Charingia SC			
	xi	Cenijan SC			
	xii	Bamungaon SC			
	xiii	Kuhiarbari SC			

Source: Joint Director, Health Services, Govt. of Assam

All the people of villages within GJRMP have to go to less than 5KM or 5 to 10 KM for any medical amenities, most people mainly come to Jorhat Town in search of specialized medical facilities.

6.2.2.1 Estimation for future Health Facility Demand

Based on URDPFI Guidelines, the demand for the health facilities in 2041 for long term basis, and intermediate year 2031 for short term basis is worked out. It seems that the quantitative requirement for health facility is fulfilled in terms of demand and availability of facilities. Jorhat Medical College and Hospital is the main centre for treatment of general public that needs up gradation with all modern facilities. However, prevailing issues like number of doctors per capita, scarcity of doctors and staff in Govt hospitals needs to be addressed.

6.2.3 Recreational Facilities

There are numbers of parks and play grounds in Jorhat Municipal area as well as in the Planning area (outside JMB area). Some of the important parks are Millenium Park, Mahatma Gandhi Park, Nehru Park, Ganesh Gogoi Kabita Kanon Park, Bakul Ban Udyan, Rajmao Pukhuri Park, Tinkonia Pukhuri Park, Rajabari Children Theme and Amusement Park, Boating Park, Green Park, JEC Park, AAU Plaza, ONGC Avian Park, Shishu Udhyaan, Fountain Park, etc.

The main play ground in Jorhat is Jorhat District Sports Association Stadium, located in the heart of the city. It is a multi-purposed playground, was built in 1915 and has capacity of 10,000 spectators. It is a venue for cricket & football tournaments, fairs & exhibition but in 2008, Jorhat District Sport Association decided to renovate the ground with all the modern facilities and with a sitting capacity of 25,000 people, construction of a cricket pitch, volleyball court, 400 meters track as well as accommodation building for 100 athletes. The cost of renovation was estimated around 6 crores and was funded by Ministry for Development of North Eastern Region and Jorhat District Administration. There are number of public fields in Jorhat viz. Jorhat Court Field, West Jorhat Sports Association Playground at Hazari Gaon, ITI playground at Toklai Cha Bagicha Gaon etc.



Fig. 6.7 Jorhat Stadium (Source: T&CP)

Jorhat Gymkhana Club

Jorhat Gymkhana Club, the oldest golf course in Asia and the third oldest in the World, established by British. The Jorhat Gymkhana Club was built in 1876 by D. Slimmon, then Secretary of the club in Chekonidhara village. The club has been a venue for horse races ever since its inauguration. The Governor's Cup is the major trophy awarded here every year. It has a lush green 9-hole golf course circuit vying for a position in the "World Heritage list" as the oldest golf course in Asia and the third oldest in the world. The club offers facilities in lawn tennis grass courts, swimming pool, billiards, polo, gentleman's bar and cinema theatre. The cricket ground here is known as 'Jorhat

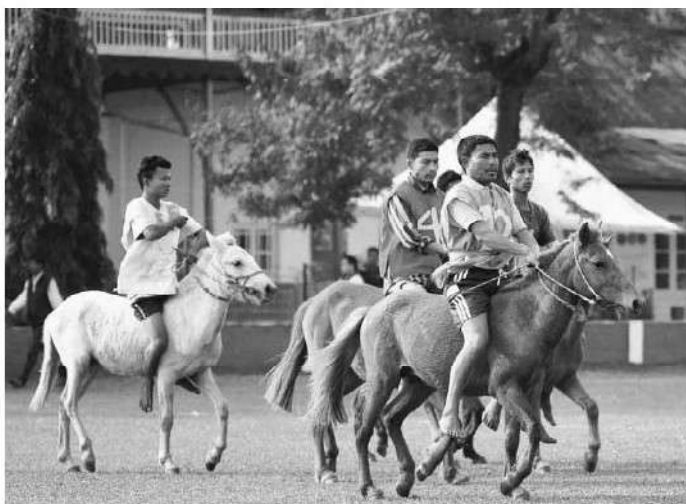


Fig. 6.8 Jorhat Gymkhana Club (Source: Unknown)

Gymkhana Ground'. It had the grace of hosting the CK Naidu Under-19 Indian Cricket tournament matches. Khelmati sports club uses this ground for practicing cricket. The Club Road was the first asphalt road laid by the Britishers to connect the City Centre with the Jorhat Gymkhana Club. Agricultural University Stadium is located in Borbheta, Jorhat, Moharram Field is located in ward No. 2, Fancy Ali, Jorhat, Kushal Konwar Indoor Stadium is located in ward no-10, Jorhat, ONGC Colony Stadium is located in Cinnamora. Jorhat Tennis Club is located in ward no-10, Jorhat. Jorhat District Sports Association field is located in JB college Road, Jorhat. Jorhat Engineering College Stadium is located in Garmur, Jorhat. ONGC Indoor Stadium is located in ONGC Colony, Cinnamora. Some other important play grounds within GJRMF area are Kachagoral Field is located in Dulakharia Gaon, Baghchung field is located in Choudang Gaon-1, and most of the Colleges and schools have own play grounds.

6.2.3.1 Estimation for future Recreational Facilities

However, the spatial distribution of the recreational facilities is not satisfactory and a majority of places are strictly deficit of playgrounds and open spaces. Unplanned growths and urban sprawls in the outskirts of the town have the least share of recreational areas, some vacant lands are utilized as open spaces, but in future there may be scarcity of open land in these localities.

6.2.4 Religious & Archaeological Sites

Jorhat was the last capital of the Ahom Kingdom, and was planned and built during that era. Jorhat also flourished as an important town during the British Era. Some of the historic sites are mentioned below:

Bongalpukhuri: The tank called Pukhuri in Assamese vernacularis is located on the southern fringe of the main Jorhat town. The tank can be easily traced only by the side of Na-ali which runs to Borholla via Titabor. In 1739, Bodon Borphookan, a compatriot but a rival to the Ahom monarchy, was murdered by Rupsing Bongal, an ally and loyal to the Ahom king. According to one source Bodon Borphukan was taking his bath in the said tank when Rupsing hurled on him and killed him. Yet another source opined that Rupsing had washed his blood-stained hands and sword at the tank water dug by him. So, the tank came to be known as Bongalpukhuri.

Borpukhuri: Bor means big and 'Pukhuri' means tank. A big tank was dug during the Ahom Rule at a place near Tarajan about 3 kms away from Jorhat town. There is a controversy over naming of the tank. Some quarter still hold the view that the name of the tank should be Buragohain Pukhuri because the tank was dug there at his instance. Whatever it should have been passed into oblivion but caters the requirements of people living around it to a great measure.

Burhi Gosani Devalaya: In a close fight with the Jayantia king, the Ahom king made a colourful victory by defeating the former. The Ahom king brought with him the image of Burhigosani and established at Rongpur in present Sibsagar district. When the then Ahom regime was frequently perturbed with war, they shifted their capital to Jorhat, so they felt it imperative to shift the idol of Burhigosani to Jorhat and established in the heart of the town. The idol is believed to be the stony incarnation of Mother Goddess – Durga. The temple is still a place of devotion to people belonging to Sakti Cult.

Hatigar Siva Temple: It is situated at 5 kms away towards east of Jorhat town directly on the Grand Trunk Road. The temple along with a tank was constructed by Swargadeo Chandrakanta Singha in the year 1817 remain to stand the strain and vagaries of nature. The erection of the temple was also closely associated with the name of late Ruchinath Buragohain.

Rajmao Pukhuri: The Rajmow Pukhuri is located at Ward no. 10 of Jorhat near Jorhat Stadium. This tank was dug during the Swargadeo Chandrakanta Singha in the year 1816.

Raja Maidam: The existing maidam (vault) which lies on the south bank of River Tocklai on the northern side of Jorhat town is of the last Ahom king, Purandar Singha, who expired on 1 October 1848. The present maidam was constructed to preserve the ashes of the last Ahom King.

Garh Ali: The word 'Garh' signifies the erection of high barricade made by filling up of earth to block the foreign enemies to make easy entry, 'Ali' means road. Here 'Garh Ali' has historical significance. This fort-like embankment was basically erected to prevent the Moamoriahs to make easy inroads to Jorhat. This runs from Seuni Ali to Nagaland hills. Moamoriahs were flabbergasted at having seen such a long barricade and make to retreat. This is, therefore, named as 'Bibudhi' (confounding) garh. Now it has become a main thoroughfare (Garh Ali) connecting Jorhat town with the eastern and southern most part of the district.

America Baptist Foreign Mission Church: Rev. S.A.D. Boggs, a Christian Baptist Missionary opened an institution for study of the Bible in 1903. The Church was located in the Rajabari Area adjacent to Jorhat town. Subsequently this institution emerged as a common prayer Hall. Besides being solely a Prayer Hall, it caters study of different disciplines such as Primary, M.V. and High Schools of the tribal students. It undertook studies on art and crafts. As soon as the second world war was over it has been transformed into a full-fledged Theological College.

All Saints Church of Cinnamara: This was constructed in the year 1895 in a plot of land donated by Jorhat Tea Co. Ltd. Bishop of Calcutta took the lead in this endeavour. As ill luck would have it, the original construction got damaged accidentally on fire in 1911.

Jorhat Old Court Building: This administrative building was constructed by British government in the year 1914. This building is the main administrative building of Jorhat district till now.

Chandrakanta Handique Bhavan: The Chandrakanta Handique Bhavan, built in 1926, was donated by late Radhakanta Handique. It is the headquarters of Asam Sahitya Sabha. Personalities like late K.K. Handique, late Chandradhar Baruah, late Dimbeswar Neog, late Mitraddev Mahanta, late Abdul Malik and other writers from Jorhat have adorned the presidency of Asom Sahitya Sabha.

Jorhat Science Centre & Planetarium: It is located near the Rajmao Pukhuri opened to the public from March 2013 onwards. A dominant feature of the digital planetarium is the large dome-shaped projection screen onto which scenes of stars, planets and other celestial objects can be made to appear and move realistically to simulate the complex motions of the heavens. This will have enhanced data mapping, data logging and astronomical planetary motion.

Moreover, Lachit Borphukan's Maidam, Ayur Sanjeeva, Thengal Bhawan, Hollongapar Gibbon Wildlife Sanctuary, Mulai Forest, Baduli Pukhuri, Borbheti are some of place of interest near to Jorhat Revised Master Plan Area.

Thus, Jorhat is the central location for reaching out to many interesting places of International importance: Majuli, Kaziranga National Park, Dhekiakhowa Bornamghar, Lachit Borphukan's Maidam, Raja Maidam, Jorhat Science Centre & Planetarium, Jorhat Gymkhana Club, Chandrakanta Handique Bhavan, Ayur Sanjeeva, Jorhat District Museum, Thengal Bhawan, Gibbon Wildlife Sanctuary, Kaziranga Golf Resort, Sukapha Samannay Kshetra, Molai forest, Shanti Ashram, Jagannath Temple, public parks, tea gardens and Siukapha Park, Gabhoru Parbat and many more.

Chapter 7: Environment And City Beautification Plan

7.1 Groundwater

Ground water development in the district is still in nascent stage. As per Central Ground Water Board, the net ground water availability is estimated to be 1273.71mcm. In Jorhat district stage of ground water development is 13%, which shows under the SAFE category as reported by CGWB. As long-term water level trend does not show any major change so the whole district may be considered as SAFE.

The water quality data generated by CGWB indicated the presence of iron content in the range of 0.20 to 2.36 ppm. Whereas Fluoride content in ground water in the district is found to be within 0.37 to 1.49 ppm. The variation is very much within the permissible limit. The water quality is found to be well within the permissible limit for drinking, irrigation and industrial purposes except high iron concentration in scattered patches, which can be removed through the process of aeration before use.

7.2 Natural Hazards

7.2.1 Earthquake

Seismically, Jorhat falls under Earthquake Prone Zone V, hence it is one of the most active areas of the world as reflected by neo-tectonic activity related to plate convergence and collision. The seismic activity of varying magnitude and intensity of several major thrusts, shear zones and lineaments passed through Jorhat. So, it may be concluded that the entire city of Jorhat is situated on risk prone areas, where earthquake of magnitude 8 or more can occur, i.e., the zones with highest intensity along the north eastern region. Since earthquake is among the dangerous and destructive natural hazard, a comprehensive earthquake hazard reduction programme should be prepared, which should include earthquake prediction, control measure, and post-earthquake rehabilitation measures. In absence of such report this plan suggests that all new development should comply strictly with National building code on earthquake resistant building code.

7.2.2 Rainfall and Floods

Annual flooding is a perennial problem of Jorhat district. The average annual rainfall in Jorhat is 2103.98 mm. About 60 to 65% of the annual precipitation is received during south-west monsoon from June to September. During this period floods occurs due to spilling of river bank where embankments are not constructed.

Bhogdoi has a number of vulnerable reaches due to erosion; as the flood embankments are very close to the river specially at meandering bends, and has created massive erosion in its un-embanked portion. Bhogdoi River has eroded several villages like Kathonibari, Pukhuria and Hatigarh TE including several wards of Moriani Town.

The following areas are identified as flood prone area in the Greater Jorhat Master Plan Area - No. 1 Bamungaon, Gohain Tekela Gaon, Kachariparia, Kachogoral and Naubaisa Gaon.

The Flood Gauge station at Bhogdoi River in Jorhat Master Plan Area under Jorhat Water Resources Department is at the N.H. Bridge crossing and the Danger Level is 89.0m AMSL. The Rain Gauge station is under W.R. Department is located at Jorhat Water Resources Office Compound, Rajabari which is maintained by Jorhat Upper Assam Investigation Division Jorhat

and send to Control Room. Annual rainfall recorded for following years are given below in the **Table 7.1**.

Table 7.1 Yearwise rainfall in Jorhat

Sl. No.	Year	Total Rainfall (mm)
1	2012	2272.85 mm
2	2013	2103.98 mm
3	2014	2217.30 mm
4	2015	2840.60 mm
5	2016	2431.60 mm
6	2017	2504.20 mm
7	2018	1736.80 mm
8	2019	1861.0 mm
9	2020	1591.00 mm
10	2021	1214.34 mm
11	2022	1922.50 mm

Source: Water Resource, Assam

7.3 Bhogdoi River

Bhogdoi is the major river that flows through Jorhat. The Bhogdoi River is a tributary of the Brahmaputra River. From its origin in the Naga hills, it flows through the city of Jorhat and then it merges with another river and its name becomes Gelabill. Bhogdoi river is one of the major sources of drinking water after treatment for the entire city as well as its nearby areas. Bhogdoi River has become polluted due to various reasons listed below. The present Land fill site for Slolid Waste Dumping and Processing is also present near the banks of Bhogdoi. Due to close proximity of the open dumpsite to Bhogdoi river as well as the city it poses risks to the citizens of Jorhat. In 2019, the Ministry of Environment, Forest and Climate Change declared Bhogdoi as one of the most polluted rivers in Assam and 351st among the polluted rivers in the country.

1. Coal mining in Nagaland introduced high levels of manganese in the river.
2. Chemical waste from the tea gardens is turning the river poisonous and polluted.
3. The drains carry industrial and residential wastes. The river has become heavily silted, reducing its carrying capacity.
4. The high BOD (Biological Oxygen Demand) indicates low water quality and less oxygen for aquatic life.
5. The massive encroachments along the river bank have been not only making the river narrower but also increasing the filth and garbage.
6. Disposing human excreta and cremating dead bodies along the river bank are gradually contaminating the soil and water of the region. This is increasing the threat of water-borne diseases.

7.3.1 Drains connecting to Bhogdoi

The drains mainly carry industrial as well as residential wastes. Direct dumping of residential and commercial garbage into the channel is making it shallower and heavily silted. As a result, during rainy season water overflows and inundates the areas. It is also observed that the drains

of the town are also becoming a regular garbage-dumping site. Moreover, these drains are not planned properly to carry even the regular water.

7.3.2 Environmental Flow of Bhogdoi

The entire river stretch in the planning area is perennial. The discharge recorded as per the master plan of Brahmaputra Board is 594.30 m³/sec and the average water level recorded is about 86 m. It is also observed that even during the dry season, the river maintains 50% of the average flow recorded.

7.3.3 Action Plan for Bhogdoi

An action plan was prepared by the Assam Pollution Control Board in 2021 of Priority Level V, and is being implemented by the District Administration. The major components of the Action Plan are given below:

1. Industrial Pollution Control
2. Identification, Channelization, Treatment and Utilization of Treated Domestic Sewage
3. River catchment/Basin Management-Controlled ground water extraction and periodic quality assessment
4. Regulating activities in flood plain zone, including management of waste.
5. Addressing issues related to Ecological/Environmental Flow.
6. Other issues which may be found relevant for restoring water quality to the prescribed standards.

Chapter 8: Land Use Plan and Planning Strategy

8.1 SWOC Analysis

A SWOC analysis is a useful tool to organise information gathered in the profile/diagnostic period, so that the Town Planning team and wider stakeholder groups can discuss, prioritise and agree on the issues the city is facing. A SWOC analysis is an analytical method which is used to identify and categorise significant internal (Strengths and Weaknesses) and external (Opportunities and Challenges) factors faced either in a particular arena, such as an organisation, or a territory, such as a region, nation, or city.

SWOC stands for:

1. *Strengths* of the city (internal).
2. *Weaknesses* of the city (internal).
3. *Opportunities* external to the city, but influencing it (external).
4. *Challenges* external to the city but influencing it (external).

8.1.1 Strength

1. The city provides good secondary education with presence of many educational and research institutions.
2. Results from gap analysis shows that quantitative requirements of basic physical and some social infrastructure (education and medical) is mostly available with a low gap, which is a good indication.
3. Plenty available of land as a resource for future growth and development.
4. Transportation is well connected to the other important cities and headquarter of the state, mainly because of the National Highway 715 passing through the city. The under construction bridge between Jorhat and Majuli will further improve the connectivity with upper bank of Brahmaputra River, up to Arunachal Pradesh.

8.1.2 Weakness

1. Due to absence of a masterplan for a long period, the city has grown haphazardly, creating a sprawl with absence of social and physical facilities in some places.
2. The absence of an integrated development strategy for the city is noticeable.
3. The city suffers from low pedestrian space index and urban open space which drastically hampers the movement and urban economy.
4. High dependency on the century old existing Central Business Area which is touching its threshold limit, and lack of new growth centres.
5. Out migration of the educated people because of lack of job opportunities is creating a brain drain of the area.

8.1.3 Opportunity

1. Due to major investment and infrastructure development in the North East Region and to connect the same with the South Asian countries under the Act East Policy, it brings a ray of hope for rapid industrialization and growth in the region which will directly influence the city.

2. Management of the city and addressing its problems can be achieved faster and easier by realization of the digital infrastructure and following of smart practices.

8.1.4 Challenges

1. The city still faces urban floods, and is located in an active flood prone zone with devastating floods in history.
2. The entire state is an earthquake prone area, and falls in a Seismic Zone V as classified by the Bureau of Indian Standards (BIS).
3. Due to presence of large agriculture farm lands, and tea estates in the periphery, there is always a risk of pollution from industries, and urban growth.

8.2 Town Vision 2041

“To develop the city into a major growth center and to provide a good quality of life for the people living in the city.”

8.2.1 Background of the Vision

Jorhat, being the one of the largest cities in the state of Assam, India and the administrative headquarter of Jorhat District, is one of the most rapidly developed urban areas of the state which is expanding very rapidly in terms of population growth and the areal expansion. The city holds a potential in turning itself a self-sustaining economic growth centre.

Nicknamed as the ‘Cultural Capital of Assam’, the city represents a cosmopolitan nature. Also, the presence of large number of educational and research institutional in the city shows the presence of educated youth as a potential human resource for development, and also makes it ideal for development as an education and cultural hub in the entire state.

8.2.2 Goals and Objectives

To understand the vision and achieve it in a better way, the same is divided into goals and objectives for the ease of development.

1. To develop the city into a major growth centre with a prosperous economic and education hub in the entire state.
2. To solve the problem of flood in the city for a long-term basis.
3. To provide a good quality of life to the people living there by meeting the necessary requirements and standards of physical and social infrastructure.
4. To realize the potential of the region, adhere to the Act-East policy of Government of India, and develop a self-sufficient model of growth for the city.
5. To improve the connectivity with the rural hinterland and regional dependencies for an efficient and high standard transport system.
6. To conserve and environment and ecology of the area, and protect them from haphazard development.
7. To utilize the natural and human resources available in a sustainable and effective manner for a followed development.
8. To meet the United Nation’s Sustainable Development Goals (SDGs) by 2030.



Fig. 8.1 Sustainable Development Goals (Source: UN)

8.3 Existing Land Use

Revised Master Plan Area is extended to a land area of 156.75 Sq. Km. out of the total land area, waste land covers 2.54 Sq. Km. or 1.58%, Water bodies cover 2.78 Sq. Km. or 1.77% and rest are used/usable land. Land-use survey was conducted in the Revised Master Plan Area, during 2015-18. The land use area has been classified into 9 broad categories; approximate area covered under each category of activities is shown in the **Table 8.1** given below. Jorhat Municipal Area has been almost fully developed. Out of the Total planning area, the predominant use is agricultural land, which occupies 83.97 Sq. Km. or 53.57 per cent of total area. Next predominant category is the residential area, which accounts 33.03 percentages, of the total area.

Table 8.1 Existing Land use

Sl. No.	Land Use Category	Area (Sq. Km.)	Percentages to Total Area
1	Residential Use	51.77	33.3 %
2	Commercial Use	1.21	0.77 %
3	Industrial Use	0.78	0.50 %
4	Public & Semi-Public Use	8.84	5.64 %
5	Recreational Use	1.52	0.97 %
6	Transport & Communication	5.87	3.75 %
	Total Developed Land	70.00	44.65 %
7	Agriculture & Tea Garden	53.42	34.1 %
8	Green Cover	30.55	19.5 %
9	Water Bodies	2.78	1.77 %
	TOTAL AREA	156.75	100 %

Source: Field Survey & Compiled by T&C P, Jorhat on the GIS map submitted by ENGECORC

8.4 Planning Theory

Central place theory is a theory of urban geography that tries to explain the spatial arrangement, distribution pattern, size, and number of human settlements in a country. It also provides the relationship between human settlements of different sizes and their economic activities with the population. The central place is an area and the main function of the central place is to provide goods and services to surrounding areas, which in this case can be considered as the Jorhat City. The city is considered to be specialized in providing various goods and services based on the threshold and range of services.

It was the German geographer, Walter Christaller who introduced the central place theory in 1933. His theory is based on the pattern of human settlement in southern Germany. Christaller explained that a large number of small settlements will be situated relatively close to one another for efficiency, because people don't want to travel far for everyday needs. But people would travel further for more expensive and infrequent purchases or specialized goods and services which would be located in larger settlements that are farther apart.

8.4.1 Principles of the Theory

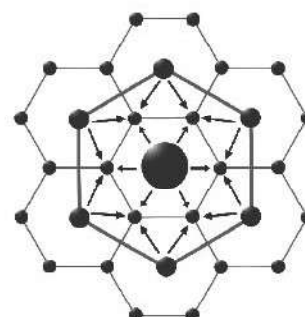
In the orderly arrangement of an urban hierarchy, seven different principal orders of settlement have been identified by Christaller, providing different groups of goods and services. Settlement is regularly spaced - equidistant spacing between same order centers, with larger centers farther apart than smaller centers. Settlements have hexagonal market areas, and are most efficient in number and functions.

The different layouts predicted by Christaller have K-values which show how much the sphere of influence of the central places takes in — the central place itself counts as 1 and each portion of a satellite counts as its portion.

K = 3 marketing principle

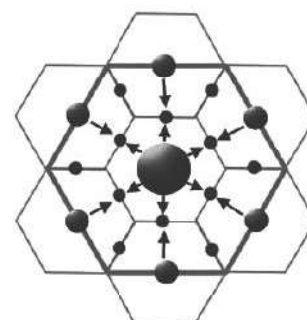
According to the marketing principle $K = 3$, the market area of a higher-order place (node) occupies one-third of the market area of each of the consecutive lower size place (node) that lies on its neighbour; the lower size nodes (6 in numbers and second larger circles) are located at the corner of a largest hexagon around low value the high-order settlement. Each high-order settlement gets one-third of each satellite settlement (which are 6 in total), thus $K = 1 + 6 \times 1/3 = 3$.

However, in this $K = 3$ marketing network the distance traveled is minimized.



K = 4 transport/traffic principle

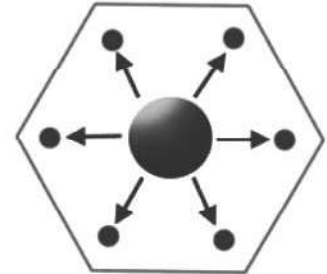
According to $K = 4$ transport principle, the market area of a higher-order place includes a half of the market area of each of the six neighbouring lower-order places, as they are located on the edges of hexagons around the high-order settlements. This generates a hierarchy of central places which results in the most efficient transport network. There are maximum central places possible that are located on the main transport routes connecting the higher order center. The transportation principle involves the minimization of the length of roads connecting central places at all hierarchy levels. In this system of nesting, the



lower order centres are all located along the roads linking the higher order centres. This alignment of places along a road lead to minimization of road length. However, for each higher order centre, there are now four centres of immediate lower order, as opposed to three centres under the marketing principle.

K = 7 administrative principle

According to $K = 7$ administrative principle (or political-social principle), settlements are nested according to sevens. The market areas of the smaller settlements are completely enclosed within the market area of the larger settlement. Since tributary areas cannot be splitted administratively, they must be allocated exclusively to a single higher-order place. Efficient administration is the control principle in this hierarchy.



8.4.2 Application of Theory in Jorhat

Jorhat also represents the same example of this theory with many small places developing in the periphery which has the basic availabilities, but is yet to develop as an established growth centre and a catalyst for further development. Apart from putting the emphasis only in the city, there shall be an inclusive development of the periphery areas. Citing this reason, the masterplan boundary has been decided including all the periphery areas of the city, which puts a direct influence to the city.

While the markets are formed originally throughout the history based on the $K=3$ principle, and the transportation routes are laid based on the $K=4$ principle. The demarcation of the masterplan boundary will be based on the $K=7$ principle.

8.5 Planning Principles

8.5.1 Transit Oriented Development

In urban planning, transit-oriented development (TOD) is a type of urban development that maximizes the amount of residential, business and leisure space within walking distance of public transport. It promotes a symbiotic relationship between dense, compact urban form and public transport use. In doing so, TOD aims to increase public transport ridership by reducing the use of private cars and by promoting sustainable urban growth.

TOD typically includes a central transit stop (such as a train station, or light rail or bus stop) surrounded by a high-density mixed-use area, with lower-density areas spreading out from this center. TOD is also typically designed to be more walkable than other built-up areas, by using smaller block sizes and reducing the land area dedicated to automobiles.

Transit-oriented development has many benefits including but not limited to:

1. Easy access to transit, making it easy to get around without a car.
2. Dense, due to TODs being made for getting around transportation, other than private vehicles, allowing access to stores and private business.
3. Improved access to jobs and city services.
4. Increased population near transit stops, such as a commuter rail stop, which ultimately increases transit ridership across the board.

A total of four TOD zones are identified in the Greater Jorhat Revised Master Plan Area of radius 400m, in (a) Baruah Chariali, (b) Jorhat ISBT and its periphery, (c) Garali, and (d) Nirmal Chariali, where there is easy access to public transport.

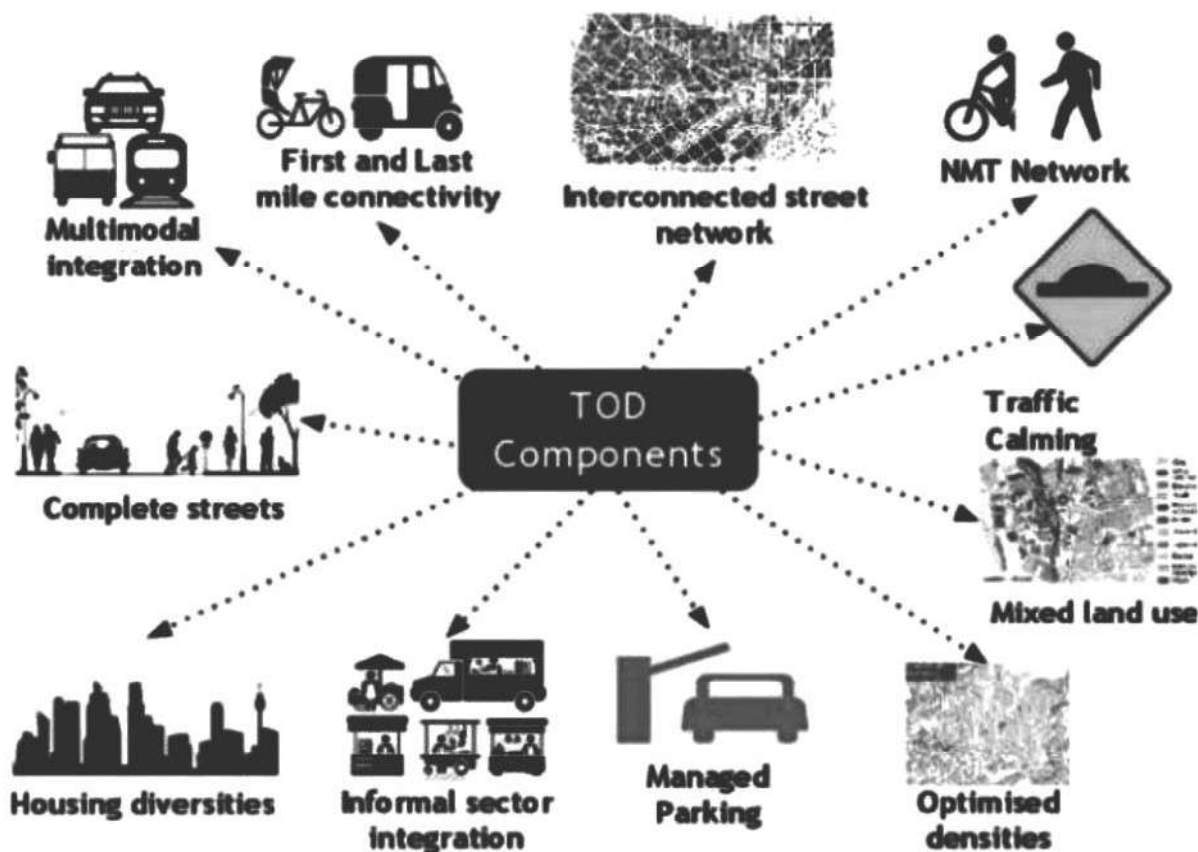


Fig. 8.2 Conceptual Diagram for Transit Oriented Development (Source: 99acres)

8.5.2 Neighborhood Planning

The term neighborhood is often used to describe the sub divisions of urban or rural settlements. In its purest definition, a neighborhood is the vicinity in which people live. Neighbourhood unit idea was proposed by Clarence Perry in 1929. Neighborhoods have some particular physical or social characteristics that distinguish them from the rest of the settlement. The clustering of these neighborhoods has formed towns, villages, and cities. The Neighbourhood unit plan in brief is the effort to create a residential neighbourhood to meet the needs of family life in a unit related to the larger whole but possessing a distinct entity.

8.5.2.1 Principles of Neighborhood Planning

The town is divided into self-contained units or sectors of 10,000 population. This is further divided into smaller units called neighborhood unit with 2,000 to 5,000 based on the requirement of one primary school. The size of the unit is therefore limited to about 1 to 1.5 sq km i.e., within walk able distance of 10 to 15 minutes.

1. **Boundaries:** The unit should be bounded on all its sides by main road, wide enough for traffic.

2. *Protective Strips:* These are necessary to protect the neighborhood from annoyance of traffic and, to provide suitable facilities for developing parks, playgrounds, and road widening scheme in future.
3. *Internal Streets:* The internal streets are designed to ensure safety to the people and the school going children. The internal streets should circulate throughout the unit with easy access to shops and community centers.
4. *Layout of Buildings:* To encourage neighborhood relation and secure social stability and balance, houses to suit the different income group should be provided such as single-family houses, double family houses, cottages, flats, etc.
5. *Shopping Centre:* Each shop should be located on the circumference of the unit, preferably at traffic junctions and adjacent to the neighborhood units. *Community Centre:* Each community will have its centre with social, cultural and recreational amenities.
6. *Facilities:* All public facilities required for the family for their comfort and convenience should be within easy reach. These include the primary school, temple, club, retail shop, sport centre, etc. These should be located within 1km in the central place so as to form a nucleus to develop social life of the unit.

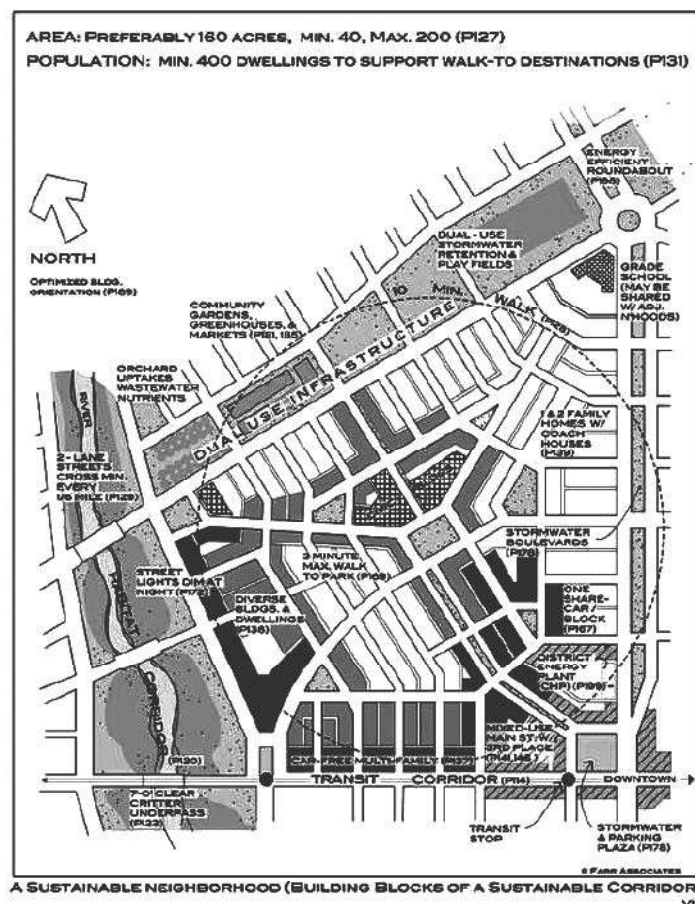


Fig. 8.3 Neighbourhood Planning Concept (Source: Semantic Scholar)

8.5.3 Urban Rural Continuum

Rural-urban continuum, the merging of town and country, a term used in recognition of the fact that there is rarely, either physically or socially, a sharp division, a clearly marked boundary between the two, with one part of the population wholly urban, the other wholly rural.

From the analytical point of view, the characteristics of these two modes of living are represented by two concepts namely 'ruralism' and 'urbanism.' Ruralism signifies the rural mode of living in which there is predominance of traditions, customs, and folk culture and joint family. On the other hand, urbanism signifies the urban mode of living in which there is predominance of impersonal relations, individualism and secondary associations.

Rural Urban Continuum is essentially the gradual change observed in terms of intensity of development from core city areas towards the peripheral area. The nature of settlement structure helps to understand the rural urban dichotomy or continuity.

8.5.4 Peri Urban Development

Peri-urban areas can be described as fringe areas of cities or adjoining rural areas, which are intrinsically linked with the city economy, experience constant transformation, and are characterised by a mix of rural and urban activities. Ravetz, Fertner and Nielsen describe peri-urban areas as “a new kind of multi-functional territory.”

UNDP (1996) defines peri-urban as an activity that produces processes and markets food and other products, applying intensive production methods and reusing natural resources and urban wastes to yield a diversity of crops and livestock. Peri urban in addition can also involve animal husbandry, aquaculture, agro-forestry and horticulture.

8.6 Strategic Framework of activities

As already mentioned, the Master Plan provides for strategic framework for land use planning in the GJRMP area for shaping the future towards vision 2041 and beyond. It sets out the spatial strategy for the growth centres as identified earlier to address the different characteristics and needs of each area.

8.6.1 Creation of economic growth centres and mass employment zones

Financial services, healthcare, agro-based industries and tourism/entertainment are the four key sectors located in different corners of planning area to boost the economic growth. For public administration services, the district level offices also shall be planned in the new proposed District Headquarter area, which is an identified growth center in the future.

Suitable zones like Cinnamara, Sotai and Tarajan Bypass point are earmarked for industries, hotel complex and modern retail format which are considered as key drivers of employment. Three sub-CBD area are proposed in the area near to present ISBT, Cinnamara Tiniali and Bypass junction in Nimati Road near Borigaon. The upgradation and renewal of present CBD of Jorhat – stretch in Garali from Nirmal Chariali to PWD point will boost the economic growth of the area. The CBD and the sub-CBDs area a proposed part of the TOD.

8.6.2 Improvement and extension of transportation system

The present intracity public transportation system in Jorhat is unplanned and consist of IPTs – 4-Wheeler maxicabs and 3-wheeler autoricksaws, which also provides regional connectivity. A well-planned public transportation system is required in the planning area which shall be connected to the intercity transportation network and shall also have feeder services like e-ricksaws for last-mile connectivity. The traffic to and from Titabar and Mariani has to pass through the city and creates a congestion. A bypass is proposed in the south of Jorhat city to divert the traffic from Titabar and Mariani.

A transport hub is proposed in the available land behind the JDA office and shifting a part of central commercial functions mainly the godowns towards the east of the region, near the proposed transport hub.

8.6.3 Increase land availability for new housing

As per the housing projection (refer Chapter 4), the GJRMP area would require a total of 68,689 housing by 2041. Based on the consideration of 150 sq.mt/housing unit and 125 F.A.R (Floor Area Ratio), with 25% circulations, and 50% ground coverage, around 8.7 sq.km of residential

land is required to accommodate the total housing required in the urban developable area of the proposed GJRMP area.

8.6.4 Upgrading of Infrastructure

1. Augmentation of water treatment plants
2. Creation of proper Sewage system and Treatment Plants
3. Identification of Solid Waste disposal sites
4. Installation of power infrastructure and substations
5. Identification of check dams
6. Construction/improvement of drainage channels
7. Access to Quality Education centres
8. Improvement of healthcare service

8.7 Proposed Plan

The Master Plan implementation requires (i) development of new areas (ii) redevelopment of existing developed areas and (iii) conservation of sensitive areas. Therefore, land use plan, land use zoning, sub-division and development control regulations would in general be the base for all development, and redevelopment in the city. The land use proposal assumed that throughout the planning area all the municipal wards, villages, OGs and CTs will be self-sufficient with all social and physical infrastructural facilities to serve the future population. The broad features of the Plan, not all the details thereof, are discussed in this Plan.

It is important to remember that the future spatial structure as visualized can be achieved and realized through the combined effort of the public and the private sectors. Efforts are made through documentation of this Master Plan in order to

- I. Indicate future land use zones for various purposes, and
- II. Indicate the pattern of the spatial structure plan and to realise the vision for Jorhat as an urban center of the Upper Assam region through innumerable concepts proposed throughout the various locations of GJRMP area.

The proposed Master Plan envisages allocation of land for urban uses like residential, commercial, public & semi-public, utilities and services, industrial, recreational, transportation, restricted areas and land under defense to meet future requirements. Land uses are proposed keeping in view the availability of developable land, carrying capacity of population and activities, conformity with surrounding land uses, site characteristics, convenient distance of work place from residential areas and ecological values.

8.7.1 Criteria considered for Land Use plan

Based on the land suitability and potential analysis, existing land use pattern, and existing situation following criteria were considered while developing land use proposals for the GJRMP area, especially within the contiguous urban developable area:

1. As the region is blessed with a river and eco-sensitive areas, the area surrounding them should be kept conserve and no or low intensity development should be allowed. No-development buffer varying from 15 meter to 50 meter should be kept surrounding the river.

2. As far as possible low intensity of residential development should be considered in the area that is in the close proximity of the eco- sensitive areas.
3. Based on the existing land use pattern, high intensity of mixed-use/composite development along the major roads should be considered.
4. Transport zone or transport related activities should be kept nearby transport facilities such as National Highway.
5. Road network should be designed to have a proper road circulation throughout the Master Plan area, with road hierarchy to provide free movement and to reduce congestion from the existing roads.

8.7.2 Future Land Use Proposals

Table 8.2 Proposed Land use

Sl. No.	Land Use Category	Area (Sq. Km.)	Percentages to Total Area
1	Residential Use	71.37	45.53%
2	Commercial and Composite Use	13.53	8.63%
3	Industrial Use	9.73	6.21%
4	Public & Semi-Public Use	11.24	7.17%
5	Recreational Use & Social Forestry	17.71	11.30%
6	Transport & Communication	19.33	12.33 %
Total Developed Land		142.91	91.17 %
7	Agriculture, Tea Garden & Bamboo Plants	8.75	5.58 %
8	Green Cover & Eco-Sensitive Area	2.31	1.47 %
9	Water Bodies	2.78	1.77 %
TOTAL AREA		156.75	100 %

Source: Compilation by T&CP, Jorhat

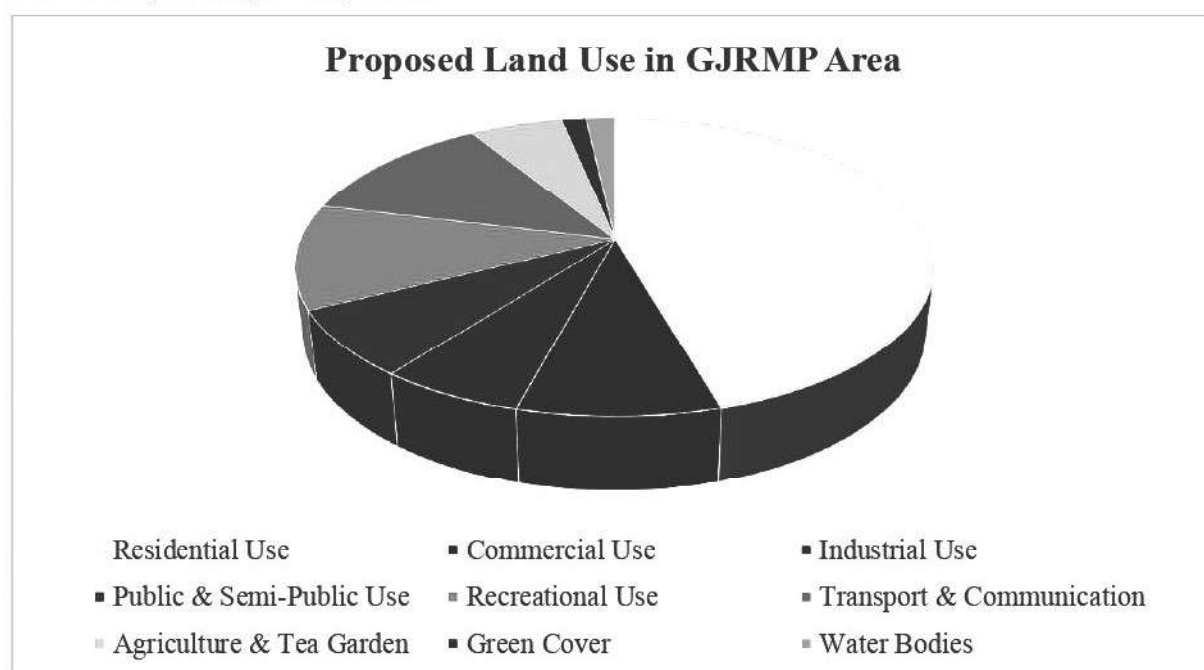


Fig. 8.4 Proposed Land use Pie Chart (Source: T&CP)

The proposed land use plan is prepared based on the following consideration:

1. Minimum dislocation of the present land use path
2. The trend of natural growth pattern of the village
3. Inter- relationship of various land use classification
4. Possible spillover of the various activities from Jorhat Town
5. Development potential of Jorhat considering interstate functions and tourist potential.

Residential Use

An area of 70.58 sq km of land are proposed for Residential use and divided in to three zones- High, Medium & Low; However, in course of time Residential Land Development are to be taken up for planned development along with basic infrastructure; main residential areas are proposed in the normal expansion of existing villages along with emerging development corridor.

Commercial Use

An area of 11.83 sq km are proposed under commercial use; it is divided into whole sale and retail activities; Jorhat central market will dominate the trading activities; however secondary centers are proposed at all the road crossings along the National Highway Bye Pass and important commercial locations like Kenduguri, Cinnamara, Tarajan, Main commercial area in the town is proposed as Central Business District (CBD). Also, an area of 2.16 sq km is suggested along the AT road in the Jorhat Town and all the important commercial locations to be connected through a composite zone, forming a circular pattern of commerce.

Industrial Use

An area of 9.71 sq km are proposed for industrial development under three categories; medium, light and obnoxious category; Industrial areas are proposed along the Cinnamara – Mariani Road. In course of time basic infrastructure services are to be provided in a phase manner.

Public & Semipublic Use

An area of 11.24 sq km of land are proposed under public and semipublic use. The present administrative centre will be shifted to near Tocklai Tea Research Institute, from the present location in Baruah Chariali.

Parks & Play Ground

An area of 5.0 sq km of land are proposed under this category; Parks and Playground are proposed by the side of each village/ community Center; Historical sites located in the planning area is proposed for preservation by planting trees in the campus ; No new construction should be allowed near the historical monument at least within 100 mts. Water bodies to be preserved as wet land by planting trees on the bank; One Eco-Tourism Complex is proposed at No 2 Gharphalia Gaon on the Jorhat Nimati Road; All the open grounds near the schools in the planning to be improved as sports ground for local needs.

Transport & Communication

An area of 19.31 sq km of land are proposed under transport and communication; All major roads especially, road from Ajanta Hall Bye Pass to Kenduguri Bye Pass are to be widened (Refer **Chapter 5** for details) and improved; missing link is proposed for development to bring the road network efficiency; Foot bridge are also proposed in the main traffic point in the main market areas.

Agricultural Use

An area of 22.90 sq km of land is proposed for agriculture use; These areas have the potential to provide vegetables and perishable requirement to the city; economic program may be initiated in phases for urban cultivation in course.

Green Belt

An area of 1.40 sq km are proposed under Green Belt Zone; The low-lying areas, water bodied and other ecologically sensitive areas are proposed in the Green Belt Zone;

8.7.3 Area Calculation for Residential Land Use

The entire projected population for 2041, as well as neighbourhood level services and amenities, are taken into account when determining the area requirements for residential property.

Table 8.3 Housing Area Required for the year 2041

Sl no.	Particular	Value
1.	Population Projected for the year 2041	333055
2.	Existing Population	245331
3.	Population to be Allocated	87724
4.	Population estimated in one neighbourhood	10000
5.	Area of one neighbourhood if gross density is 100 PPH	1 sq.km
6.	Total neighbourhood clusters required	8.7
7.	Total Residential Area required	8.7 sq.km

Source: Compilation by T&CP, Jorhat

8.7.4 Area Calculations for Social Infrastructure

Table 8.4 Estimation of area requirement for Social-Cultural infrastructure

Sl no.	Category	Strength	Population Served	Area Required	No. Required	Total Land Area
1	Anganbadi	30	5000	300	66	19800
2	Community Room	75	5000	750	66	49500
3	Community Hall	200	15000	2000	22	44000
4	Theatre Hall	100	100000	1000	3	3000
5	Recreational Club	300	100000	10000	3	30000
6	Old Age Home	100	500000	1000	1	1000
7	Religious Facilities					
7a	At neighbourhood/housing cluster level	100	5000	400	66	26400
7b	At sub-city level	5000	1000000	40000	1	40000
Total Area (in hectare)						21.37

Source: URDPFI/Compiled by T&CP, Jorhat

Table 8.5 Estimation of Area requirement for open spaces

Sl no.	Category	Population Served	Area Required	No. Required	Total Land Area
1	Housing Area Park	5000	5000	33	165000
2	Neighbourhood Park	15000	10000	11	110000
3	Community Park	100000	50000	3	150000
4	Recreational Park/City Park	500000	120000	1	120000
5	Community Multipurpose Ground	100000	20000	3	60000
6	District Multipurpose Ground	500000	40000	1	40000
Total Area (in Hectares)					64.5

Source: URDPFI/Compiled by T&CP, Jorhat

Table 8.6 Estimation of Area requirement for Sport facilities

Sl no.	Category	Strength	Population Served	Area Required	No. Required	Total Land Area
1	Residential Unit Play Area	50	5000	5000	23	115000
2	Neighbourhood Unit Play Area	150	15000	15000	8	120000
3	District Sports Centre	750	100000	80000	1	80000
Total Area (in Hectares)						31.5

Source: URDPFI/Compiled by T&CP, Jorhat

Table 8.7 Estimation of Area requirement for distribution services

Sl no.	Category	Population Served	Area Required	No. Required	Total Land Area
1	Petrol Pump	20000	1080	17	18360
2	LPG Godown/Agency	50000	520	7	3640
3	Milk Distribution	5000	150	66	9900
Total Area (in Hectares)					3.19

Source: URDPFI/Compiled by T&CP, Jorhat

Table 8.8 Estimation of Area requirement for Police and Civil Defence

Sl no.	Category	Strength	Population Served	Area Required	No. Required	Total Land Area
1	Police Post	10	50000	1600	3	4800
2	Police Station & Civil Defence/Home Guards	40	90000	20000	2	40000
3	District Office	100	1000000	48000	1	48000
4	Police Line	200	2000000	60000	1	60000
5	District Jail	200	1000000	100000	1	100000
6	Police Firing Range			100000	1	100000
Total Area (in Hectares)						35.28

Source: URDPFI/Compiled by T&CP, Jorhat

Table 8.9 Estimation of Area requirement for Safety Services

Sl no.	Category	Population Served	Area Required	No. Required	Total Land Area
1	Fire Station	100000	10000	4	40000
2	District Management Centre		20000	1	20000
Total Area (in Hectares)					6

Source: URDPFI/Compiled by T&CP, Jorhat

Table 8.10 Estimation of Area requirement for Miscellaneous Activities

Sl no.	Category	Strength	Population Served	Area Required	No. Required	Total Land Area
1	Post Office/Courier Counter	5	15000	85	33	2805
2	Head Post Office	40	250000	750	1	750
3	Bank with extension counters & ATMS	10	15000	80	9	720
4	Bank with locker, ATM & other facilities	40	100000	2500	2	5000
5	Cremation Ground		500000	25000	1	25000
6	Burial Ground		500000	40000	1	40000
Total Area (in Hectares)						7.4275

Source: URDPFI/Compiled by T&CP, Jorhat

Chapter 9: Proposed Projects' Brief and Tentative Funding Source

9.1 Extent Of the Local Planning Area

Jorhat Municipal area and neighbouring 12 Outgrowths, 6 Census Towns, and 41 villages are included in the Revised Master Plan Area for Greater Jorhat – 2041. Jorhat, being the knowledge city, attracts students from various corners, both from Assam and other states. The existing institutions attracts lots of student both from Assam and neighbouring states. The construction of 4 lane from Numaligarh to Jorhat has also opened new development corridor.

9.2 Population Projection

The total population projected for the year 2041 is 3,33,055 and the population projected for the intermediate year 2031 is 2,98,814. Refer **Section 2.7** for details.

9.3 Proposed Land Use Plan

The **Table 9.1** below compares the existing land use with the proposed land use.

Table 9.1 Comparison of Existing and Proposed Land Use of GJRMF Area

Sl. No.	Land Use	EXISTING LANDUSE (as per New Boundary)		PROPOSED LANDUSE (as per New Boundary)	
	Category	Area (Sq. Km.)	%	Area (Sq. Km.)	%
1	Residential Use	51.77	33.3 %	71.37	45.53%
2	Commercial and Composite Use	1.21	0.77 %	13.53	8.63%
3	Industrial Use	0.78	0.50 %	9.73	6.21%
4	Public & Semi-Public Use	8.84	5.64 %	11.24	7.17%
5	Recreational Use & Social Forestry	1.52	0.97 %	17.71	11.30%
6	Transport & Communication	5.87	3.75 %	19.33	12.33 %
	Total Developed Land	70.00	44.65 %	142.91	91.17 %
7	Agriculture / Tea Garden & Bamboo Plants	83.97	53.57 %	8.75	5.58 %
8	Green Belt / Eco Sensitive Zone	0.0	0 %	2.31	1.47 %
9	Water Bodies	2.78	1.77 %	2.78	1.77 %
	TOTAL AREA	156.75	100 %	156.75	100 %

Source: Compilation by T&CP, Jorhat

9.4 Protection Of Economic Base and Employment

Planners are concerned with the likely demands of land development for various economic activities, the possible location of these activities within a city or city regions; the broad relationship between these activities and the scale and timing of migration into and out of the area; Formal sector trading is to be promoted in the planning areas by providing necessary financial assistance from bank and training; Industrial activities and trading and services will provide income and employment; For weaker section care to be taken to provide employment

and basic services under poverty alleviation scheme; Labor localities that have come up in the sub urban villages, in the planning area deserve special attention; Horticulture, Fisheries Dairy and Poultry activities to be promoted in the planning area to provide local needs and export to other urban centers where there are sufficient demand.

Safeguarding of vending zones is crucial for the economy of the city, in India the informal economy holds a huge potential, and the glory of Indian open street markets shall be preserved. Keeping in mind, two vending zones are proposed in (a) Old Public Bus Stand Facility beside the under-construction parking, (b) ASTC Bus Stand in Baruah Chariali. These proposals shall be incorporated in the existing markets and parking proposals in the existing site.

9.5 Housing Requirement

As per projected population and local supply, housing requirement in the planning area is estimated upto the year 2041 to be 68,689, and an intermediate requirement was calculated for the year 2031, and the requirement was found to be 37,138 (Refer **Section 4.2** for details). Housing for weaker section is to be promoted with assistance from the Bank/ PMAY-Urban and Rural for both areas/HUDCO/ Budgetary assistance and local mobilization of resources in cash or in kind. Upper poverty alleviation scheme, training to be provided to weaker section, with this they can construct the building, once materials (locally available) are provided under Govt. sponsored / partly shared scheme; Land Development-Building construction linked scheme is proposed to initiate under PMAY/HUDCO/FIS for better off section.

9.6 Circulation

Proposed growth and functioning of any area and its efficient management is very much dependent on the circulation pattern and it is vital part of the whole physical plan; The proposed circulation pattern envisages effective linkage within the region and direct linkages between different areas and functionally interrelated uses for easy accessibility. Following **Table 9.3** is the hierarchical classification of roads and the recommended road width and capacity.

Table 9.2 Proposed Road Classification and Widening

Sl. No.	Name of the Major Road	PWD Classification	Length (in km)	ROW as per available land (in m)	Proposed	
					Road Width (in m)	Capacity of Traffic Flow (in PCU/hr)
Arterial Roads						
1	NH 715	NH 715 (Old NH 37)	21.5	45	60	5400
Sub - Arterial Roads						
2	A T Road	PWD (NH)	7.64	15	30	4000
3	K B Road	State Highway 33	6	16	20	2500
4	Jorhat Mariani Road	State Highway 31	12	10	20	2500
5	Jorhat Titabar Goronga Road	State Highway 32	10	10	20	2500
6	Cinamara Titabar Road	Major District Road	2	12	20	2500

7	Nimati Road	Major District Road	7.1	7.5	20	2500
8	Charigaon Road	Rural	6.06	7	20	2500
9	Garali Road (Nirmal Chariali to KB Road)	Municipal Road	0.78	22	30	4000
10	Borpatra Ali	Municipal Road	1.36	26	30	4000
Collector/Distributor Roads						
11	Sonari Gaon	Rural	2.6	7.5	15	1200
12	Borbheta Chariali to AAU	Rural	0.65	10	20	2500
13	Agricultural Farm Road	Rural	2.38	12	20	2500
14	TRP Road	Rural	1.6	22	25	3500
15	Garmur Tocklai (JEC) Road	Rural	4.8	12	20	2500
16	Bamun Gaon to JEC Road	Rural	2.56	7	20	2500
17	J B Road	Rural	3	12	20	2500
18	Mallow Ali	Rural	3	11	20	2500
19	K K Handique Road	Municipal Road	1.14	17	20	2500
20	Na Ali to JMM Road	Rural	1.09	9	20	2500
21	Club Road	Rural	2.05	20	20	2500
22	KKB Road	Rural	0.78	12	15	1200
23	Darangi Chuk Road	Municipal Road	0.65	10	15	1200
24	Cinamora Bazar Road	Rural	2.7	10	12	1200
25	Raja Maidam Road	Rural	0.95	10	15	1200
26	Tokolai Road (Tokolai Rajabari village to Mission compound Tiniali)	Rural	1.1	10	20	2500
27	Sankarpur Road	Rural	1	7	20	2500

Source: Compilation by T&CP, Jorhat

Apart from the above-mentioned roads, any other roads shall be as following:

1. Arterial Roads shall have a ROW of 60 m.
2. Sub-Arterial Roads shall have a ROW of 30 m.
3. Collector/Distributor Streets shall have a ROW of 15 m.
4. Local Roads shall have a ROW of 10m.
5. Access Streets shall have a width of minimum 6.6m, excluding the drains.

9.6.1 Black Spots and Choke points

Also, for safety of commuters, black spots are identified in the planning area (Refer **Section 5.3.3**, which needs to be addressed immediately. And for ease of commuters, choke points are identified in the city (Refer **Section 5.3.2**), which needs to be addressed immediately.

9.7 Infrastructure

The gap has been analyzed and the requirements for the infrastructure has been calculated in detail. Please refer to **Section 6.1** for the detail analysis of physical infrastructures, and **Section 6.2** for the detail analysis of social infrastructure and **Section 8.7.4** for Area requirement.

9.8 Projects Identified for GJRMP Area

Sector-wise projects identified for implementation in phased manner for the Greater Jorhat Revised Master Plan Area up to 2041.

Table 9.3 List of Identified Projects in GJRMP Area

Sl no.	Projects	Details	Phase I (2023-31)	Phase II (2031-36)	Phase III (2036-41)
URBAN DEVELOPMENT					
1.	Town Planning Scheme	TPS development in Ailamukhia Gaon, No. 2 Bamun Gaon, and Naosolia Gaon in an area of 82.9 Ha (620 Bigha)	Planning & Implementation		
		TPS development in locations proposed for Phase II		Planning & Implementation	
2.	Local Area Plan and Development	Local Area Development through the use of the principles of Urban Design and Urban Renewal in Ward VIII, Parts of Ward V, VI, VII, and X.	Planning	Implementation	
3.	Central Business District	Sub CBD development in the identified site of JDA Public Bus Stand. (Approx 14 Bighas)	Planning & Implementation		
4.	Market	Redevelopment of Chowk Bazaar into an Integrated Multi-Purpose Commercial Building.	Implementation		
		Construction of Vending Zones in selected sites (Refer Section 9.4)	Notification & Development		
PHYSICAL INFRASTRUCTURE					
1.	Sewerage Network	Preparation of DPR and implementation of Sewerage Network for the Planning Area	Planning, Implementation & Monitoring		
2.	Sewage Treatment Plant	Building of STPs with a capacity of 40 MLD for the planning area. (Refer Section 6.1.4)	Planning & Implementation		
		Implementation of Action Plan for Sewerage Management (Refer Section 6.1.4.3)	Implementation from the Date of Notification of Master Plan		
3.	Water Supply	Preparation of DPR and Implementation for extension	Planning	Implementation	

		of water supply capacity in the planning area.		
		Implementation of Action Plan for Sustainable Water Supply and Management (Refer Section 6.1.1.6)	Implementation from the Date of Notification of Master Plan	
		Installation of Water meters.	First 35 % Households	Rest 65 % Households
4.	Drainage	Preparation of Drainage Master Plan and implementation	Planning & Implementation	
		Identification of natural wetlands for stormwater collection	Identification and Notification	
		Installation of groundwater discharge pits.	Planning & Implementation	
5.	Soild Waste	Preparation of DPR and implementation of scientific solid waste recycling and processing plant in proposed new Landfill Site.	Planning & Implementation	
		Implementation of Action Plan for Solid Waste Management (Refer Section 6.1.5.3)	Implementation from the Date of Notification of Master Plan	
		Covering of existing Land fill site with soil.	Implement after execution of proposal in new site.	
6.	Power	Upgradation of Existing facility and Capacity.	Planning & Implementation	
TRANSPORTATION				
1.	Southern Bypass Road	Construction of 18.0 km length Southern Bypass in GJRMF Area. (To be taken by PWD Dept.)	Planning & Construction	
2.	Road Widening	Widening of Roads as per recommended width in <u>Section 9.6 (Table 9.3)</u>	Notification, land aquisition, and widening	
2.	Comprehens ive Mobility Plan	Preparation and Implementation of Comprehensive Mobility Plan for the Planning Area, with focus of regional connectivity.	Planning	Implementation
3.	ISBT	Renovation of ISBT Jorhat with improved Public Amenities.	Planning & Construction	
4.	Black Spots	Implementation of measures to reduce the vulnerability of black spots identified. (Refer Section 5.3.3)	To be considered as priority	
5.	Flyover	Construction of Road Overbridge in Garali Road at Lahoty Petrol Pump Crossing.	Planning & Construction	
		Construction of Interchange in Cinnamora Junction	Planning	Construction

6.	Parking	Construction of Multi-Storied Car Parking Facility in Ward VIII (Near Old Public Bus Stand in a new identified site)	Planning & Construction		
		Construction of Multi-Storied Car Parking in Ward VI/VII (Land to be identified later on)	Planning	Construction	
7.	NMT	Construction of Non-Motorised Transport Facilities (Cycle Tracks and Cycle Parking Bays)	Planning & Construction		
8.	Pedestrian Movement	Construction and improvement of Footpaths as per IRC guidelines for seamless pedestrian movement across the city.	Planning & Construction		
SOCIAL INFRASTRUCTURE					
1.	Multi-Disciplinary National Institute	A Land of has been identified in Kalakhowa Gaon. Final descision to be taken by Ministry of Education.	Planning & Notification	Implementation	
2.	District Sports Centre	Implemented by Ministry of Sports in Ward no. X (Old Jorhat Stadium Site).	Work in Progress		
3.	Hospital	Development of Multi-Speciality Hospital in the TPS site.		Planning & Implementation	
4.	Auditorium	Construction of a 1000-seater Auditorium is being implemented by DoHUA in the old site of BB Hall.	Work in Progress		
RECREATIONAL					
1.	Parks	Several Parks in the city has been identified (Nehru Park, Rajabari Park, & Gandhi Park) and is being redeveloped by DoHUA.	Work in Progress		
		District Level Recreation Park (Land to be identified for)	Planning & Notification	Implementation	
2.	Water Bodies	Construction of Banks & Beautification of Existing Water Bodies (Rajmaw Pukhuri, Hatigarh Shiv Doul Pond, Tinikunia Pukhuri) is being implemeted by DoHUA.	Work in Progress		
3.	Waterfront Development	Waterfront Development Project in the banks of Bhogdoi River at Macharhat (Near AT Road) is being identified and implemented by Irrigation Dept.	Planning & Notification	Implementation	

Source: Compilation by T&CP, Jorhat

9.8.1 Major Projects to be Undertaken

9.8.1.1 Town Planning Scheme

Town Planning Scheme is an effective tool of implementation of Development Plan of a city through land pooling and readjustment mechanism that allows the city to appropriate land from private landowners for public purposes, such as roads, open spaces, low-income housing, underlying utility infrastructure, and other health, education and community services.

Provisions of TPS

1. Laying out or relaying out of land
2. Reclamation of low lying, swampy areas
3. Lay out of new streets / roads or closing
4. Construction, alteration or removal of structures
5. Allotment or reservation of roads and public purpose plots to the authority
6. Availing land for drainage, water supply and public lighting
8. Implementation of development control regulations
9. Suspension of any rule, regulation, order for proper carrying out of scheme

Proposal for Town Planning Schemes (TPS) in the planning area are given below:

Table 9.4 Proposed Town Planning Scheme Locations

Sl No	CLASS	Location [#]	Area (Sq.km) [#]
Phase I			
1.	TPS	Ailamukhia Gaon, Naosolia Gaon, No. 2 Bamun Gaon	0.83
Phase II			
2.	TPS	Chengeli Gaon	0.54
3.	TPS	No 1 Bamun Gaon	1.75
4.	TPS	No 2 Bamun Gaon	0.69
Total			3.81 sq.km

Source: Compilation by T&CP, Jorhat

#Note: Town Planning Scheme Location and Area is subject to change due to uncertain conditions.

9.8.1.2 Proposal of Southern Bypass

A bypass road of 18.0 m length and 30.0m ROW is proposed in the south of the city (Refer Circulation Map) to distribute the traffic load in the existing roads, and reduce the congestion. Proposal of this arterial road shall facilitate the following:

1. Reduce Congestion by absorbing the access traffic load in city, especially for the traffic moving to Mariani and Titabar, and other southern areas of the district.
2. An alternate route for goods transportation which can be used even in day time.
3. Alternate route for people of Mariani, Titabar, and other southern parts of the district travelling to other cities/areas, who otherwise has to travel through the city because of the absence of a Bypass.



Map 9.1 Proposed Southern Bypass in Jorhat (Source: Google Earth)

Specifications of Proposed Bypass Road:

1. Phase I construction for a carriageway of 11.25m (7.5m 2 moving lane + 1.375m two parking lane)
2. Approx. Land Required: 405 Bigha
3. Proposed Road ROW: 30m

Project components:

1. 16.95 km length of road with flexible pavement.
2. Flyover in (Garali Road): 90m span + 2 x 100m approach
3. Road over bridge in Jorhat to Furkating Railway line: 30m span + 2 x 100m approach
4. VUP (5.5m high): 3 no.
5. Bridge (Bhogdoi): 200m span + 2 x 100 m approach
6. Major Traffic Junctions in KB Road, Naali Road, and JEC Garmur Road
7. Metal Crash Barrier on both side of road.
8. Lined Drain on both side of the road.

Table 9.5 Project Cost Analysis for the Proposed Bypass Road

PROJECT COST ANALYSIS				
Sl no.	Description	Value	Cost per Unit (in Cr.)	Total Cost (in Cr.)
Flexible Pavement				
1.	Length in km	16.95	6.42	108.82
2.	Embankment Height in meter	2.0		
3.	MSA	110		
Major Junction (X type)				
4.	Number of Junction	3	0.962	2.87

Major Junction (Y type)				
5.	Number of Junction	2	0.509	1
RE Wall Structure Approach				
6.	Area in sqm	6300	0.002	12.6
Bridge				
7.	Area in sqm	1800	0.004	7.2
ROB				
8.	Area in sqm	270	0.008	2.16
Flyover				
9.	Area in sqm	810	0.004	3.24
VUP				
10.	Area in sqm	243 (81 x 3no.)	0.003	0.729
Metal Beam Crash Barrier				
11.	Length in meter	33900	0.0004	13.56
Lined Covered Drain				
12.	Length in meter	36000 (18.0km x 2no.)	0.0007	25.2
Total Construction				193.4
The provision of various miscellaneous items such as Toll Plaza, Rest Area, Bus bays, Truck lay-byes, ATMS, Foot over bridge, Road & Traffic signage, Wayside amenities, ambulance, crane and other project facilities. Cost of these items may be worked out as per site requirement in each case or lump-sum provision @ 10% to 15% of Total Project Cost.				26.6
Grand Total				203.979

Source: Normative Cost Norms for National Highways in Plain and Rolling Terrain 2022, NHAI

9.8.1.3 Sub-Central Business District

A commercial hub development project has been undertaken and will be implemented by the Dept. of Town and County Planning in the identified site of JDA Public Bus Stand with an available land area of 19,650 sq.m. (Approx. 14 Bighas)



Map 9.2 Sub-CBD Development site (Source: Google Earth)

9.8.1.4 Local Area Planning

A local area planning and development will be undertaken and implemented by the Dept. of Town and County Planning in the heart of the city and the Central Business District with an available land area of 0.7 sq.km. (Approx. 515 Bigha)



Map 9.3 Proposed Local Area Plan and Development Site Map (Source: Google Earth)

9.8.1.5 Multi-Disciplinary National Institute

A much needed requirement to fulfill the vision of a knowledge city is a Multidisciplinary National Institute, for which a land area of 1.0 sq.km is identified in Kalakhowa Gaon.



Map 9.4 Site identified for Institute (Source: Google Earth)

9.9 Enforcement Of Master Plan

The proposed master plan once approved and adopted by the Govt. of Assam, will be enforced by the Jorhat Development Authority as per provision of Uniform Zoning Regulations already approved by the Govt. of Assam.

Line department shall prepare concept paper / DPR whichever is applicable as per directive of the government for consideration of funding under 10% pool fund, NLCPR, NEC, State Finance Commission, CSR Fund of Pvt. Sector etc. in a phased manner during the Master Plan period i.e., up to 2041. A few selected schemes like housing colony can be considered under PPP mode.

Table 9.6 Responsibilities of different departments of Govt. of Assam, regarding the proposal

Sl. No.	Name of line Department/Agency/	Proposal
1	Jorhat Municipal Board / Town & Country Planning / Jorhat Dev. Authority	Affordable Housing Scheme, Solid Waste Management, Construction of vendor & Hawker Market, Bus Stand & Parking, ISBT, ICC, Neighborhood Centre /RLDS
2	Public Works Department & Jorhat Municipal Board	Footpath & cycle Track Road signage in roads and in accident prone area Road Signage & Street Furniture, Fly over
3	APDCL & Jorhat Municipal Board	Improvement of street lighting
4	Public Administration and Jorhat Municipal Board	Smart City, Integrated Administrative Block
5	Public Works Department / NH	Widening of Road, Rotary & Traffic Island
6	Jorhat Municipal Board and Town & Country Planning Assam	Development of Drainage System
7	Jorhat Municipal Board and Public Health Engineering Department	Improvement of sanitation
8	PHE Department & Assam Urban Water Supply and Sewerage Board	Water Supply Scheme
9	Education Department, NGO and Private Agency	Education Facilities
10	Health Department, NGO & Private Agency	Health Care Facilities
11	Sports & Youth Welfare Department & Sports Association	Development of playground and construction of stadium
12	Social Forestry, Jorhat Municipal Board, Public Administration and NGO	Protection & Conservation of environmentally Sensitive zone
13	Social Forestry Department	Roadside Plantation & Urban afforestation
14	Agriculture Department	Urban Agriculture & Organic Farming
15	Fire Service	Up - gradation of State Fire Service
16	Transport & Railway Department	Transit Zone, Public Transportation, Fly over.
17	District Industry and Commerce Centre	Industrial Estate

Source: Compilation by T&CP, Jorhat

Chapter 10: Disaster Plan

10.1 Need for Disaster Management

Jorhat falls under Seismic Zone V and witnessed two major earthquakes in the region. The Assam-Tibet Earthquake of 1950 measuring 8.5 in the Richter scale was the worst felt earthquake in the district and nearly 4000 people lost their life in the state. With increased density of urban population over the period combined with haphazard growth the risk from earthquake has increased manifold.

Data on disaster occurrence, its effect upon people and its cost to countries, are primary inputs to analyze the temporal and geographical trends in disaster impact. Disaster losses, provide the basis for identifying where, and to what extent, the potentially negative outcomes embedded in the concept of risk is realized. They help to understand where, and to whom, disaster risk becomes impact. They also provide the basis for risk assessment processes, a departing point for the application of disaster reduction measures.

Development cannot be sustainable unless disaster mitigation is built into development process. Investments in mitigation are more cost effective than expenditure on relief and rehabilitation. Prevention and mitigation contribute to lasting improvement in safety and are essential to integrated disaster management. Disaster response alone is not sufficient as it yields only temporary results at very high cost. So, emphasis must be on Disaster prevention, mitigation and preparedness, which help in achieving objectivity of vulnerability reduction.

As per Section 40 of Disaster Management Act 2005 that every department of the State Government shall prepare a Disaster Management Plan.

10.2 Importance of Disaster Management

Disasters are events that have a huge impact on humans and/or the environment. Disasters require government intervention. They are not always unpredictable. Floods take place in valleys and flood plains, droughts in areas with unstable and low rainfall, and oil spills happen in shipping lanes. This predictability provides opportunities to plan for, prevent and to lessen the impact of disasters.

Disasters arise from both natural and human causes, and the responses needed could stretch community and government capacity to the limit. Disasters are inevitable although we do not always know when and where they will happen. But their worst effects can be partially or completely prevented by preparation, early warning, and swift, decisive responses.

Disaster management aims to reduce the occurrence of disasters and to reduce the impact of those that cannot be prevented. The government White paper and Act on Disaster Management define the roles of Local Authorities as well as Provincial and National government in disaster management.

North East Region has been vulnerable to many disasters in the past both natural and manmade, we can notice that most of the disasters have occurred within the last two decades, and the frequency, intensity and magnitude of the disasters are ever increasing.

10.2.1 Objectives

The objectives of the District Disaster Management Plan are:

1. Disaster management shall be in the routine affairs of the department.

2. To provide technical and humanitarian assistance during disaster.
3. Prompt and effective discharge of departmental responsibilities during disaster situations
4. Ensuring safety of departmental infrastructure, human resource and other assets
5. Ensuring safety of the beneficiaries and others
6. Speedy restoration after disaster impact
7. To conduct trainings and capacity building for effective prevention, mitigation and response for disasters.
8. To undertake information, education and communication activities to create awareness among the communities and the general public.

10.2.2 Disaster Management Cycle

In multi-hazard response plan, the disaster management cycle has a significant role to play. The four stages of disaster cycle have their own importance in terms of their implementation during, after and before the occurrence of any disaster.

10.2.2.1 Pre disaster activities

1. Policy development and National, State, district, local level disaster organization formation
2. Vulnerability and capacity assessment.
3. Prevention and mitigation
4. Preparedness, planning and training

10.2.2.2 Emergency activities

1. Warning (beginning before the actual event)
2. Evacuation, search and rescue
3. Emergency assistance (relief) – food, water, shelter, medical aid.

10.2.2.3 Post disaster activities

1. Repair and restoration of life lines (power, telecommunications, water transportation)
2. Reconstruction and rehabilitation.

10.3 Understanding the Risk

Disaster risk is part of every day. Awareness of risk is therefore a necessary condition to engage in disaster risk reduction. The focus on risk management, rather than on the disaster event, reflects a proactive attitude for dealing with potential threats to social and materials assets, before they are lost. The analysis and lessons learned from prior experiences of disasters help to define profiles of risk attached to people, activities and places that share attributes, in the face of particular potential sources of damage. Understanding risk relates to the ability to define what could happen in the future, given a range of possible alternatives to choose from. Assessing risks, based on vulnerability and hazard analysis, is a required step for the adoption of adequate and successful disaster reduction policies and measure.

10.3.1 Risk

The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable/capable conditions.

$$\text{Risk} = \frac{\text{Hazard (H)} \times \text{Vulnerability (V)}}{\text{Capacity (C)}}$$

or

$$\text{Risk} = \text{function of (H and V / C)}$$

10.3.1.1 Components of Risk

Hazard

A hazard is a natural process or phenomenon that may pose negative impacts on the economy, society, and ecology, including both natural factors and human factors that are associated with the natural ones.

Vulnerability

Vulnerability describes the degree to which a community is susceptible in the event of a disaster.

Capacity

Capacity refers to all the strengths, attributes and resources available within a community, organization or society to manage and reduce disaster risks and strengthen resilience.

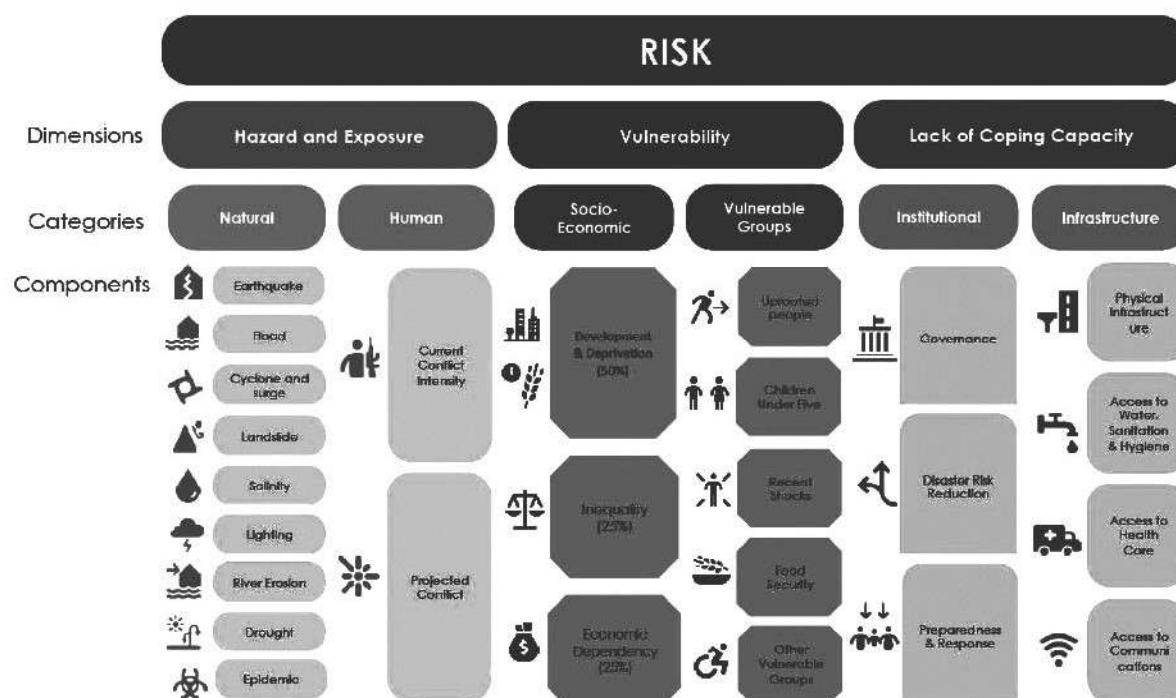


Fig. 10.1 Components of Risk

10.3.2 Classification of Hazards

The High-Power Committee of the Govt. of India has classified the hazards as follows

Table 10.1 Classifications of Hazards

Sl no.	Category	Type of Disaster
1.	Water and Climate Related	Floods and Drainage management Cyclones Tornadoes & Hurricanes Hailstorm Cloud burst Snow Avalanches Heat & cold Waves Thunder & Lightning Sea Erosion Droughts
2.	Geological Related	Earthquakes Landslides & Mudflows Dam Bursts & Dam Failures Mine Fires
3.	Chemical Industrial and Nuclear Related	Chemical and Industrial Disasters Nuclear Disasters
4.	Accident Related	Road, Rail and other Transportation accidents including Waterways Mine Flooding Major Building Collapse Serial Bomb Blasts Festival Related Disasters Urban Fires Oil Spill Village Fires Boat Capsizing Forest Fires Electrical Disasters & Fires
5.	Biological related	Biological Disaster & Epidemics Food Poisoning Cattle Epidemics Pest Attacks

Source: National Disaster Management Authority

10.3.3 Vulnerability Analysis of Jorhat District

Earthquake

As per the latest seismic zoning map of India, the Jorhat District falls under High-Risk Zone-V, where a maximum intensity of IX can be expected.

Flood

The general reason of occurrence of flood in Jorhat District is due to overflow of River Brahmaputra and its tributaries, namely Bhogdoi, Janjhi, Teok, Kakodonga. Jorhat Town faces

urban flooding due to artificial reduction Cross section of Tributaries, namely Torajan, Athubhanga Jan, Rowriahjan and improper execution of drainage System.

Soil Erosion

The soil erosion at the embankment of Brahmaputra is major threat to many places in Jorhat District.

Fires

The fire takes places in Jorhat District due to short circuit in commercial areas. Mainly fire takes place from March to April when the climate remains very dry and probability is more instance of fire breakout. The Borhola area under Titabor Sub-division also prone to chemical and industrial disaster due to having oil and natural gas Rigs and production plants in many parts.

Cyclone

In Jorhat District cases related to low density cyclone occurred in some places.

Table 10.2 Seasonal calendar for different types of hazards

Sl. No.	Type	Hazard												Remarks
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Flood													
2	Earthquake													
3	Fire													
4	Landslide													
5	Cyclone													
6	Erosion													
7	Epidemic													
8	Accident													
9	Riot													

Source: Assam State Disaster Management Authority

10.3.3.1 Geographical extent of Disasters and magnitude/severity

1. Jorhat district, especially the world's largest river island Majuli, a subdivision of Jorhat district is severely prone to flood. Erosion of river bank is a common criterion, which is major threat to Majuli too. Moreover, some parts of Jorhat town, there are every chance of flash flood due to heavy rainfall. Such flash floods have been experienced during last few years.
2. Assam as a whole is within the Zone V of earthquake zone. Especially Jorhat has witnessed a devastating earthquake in 1950. So, it can be said that geographically and geologically Jorhat is situated in a very hazards prone zone in the context of earthquake.
3. Chances of Landslide are comparatively less in this district.
4. Fire can break out in the congested residential and commercial areas, markets of the town anytime during lean season, so is the risk of epidemic in the slum/basti areas. The

district has faced cyclones several times in the past. Road accident, rail accident, collapse of multi-storied buildings etc. may occur at any time; of course, communal/other riot is not so common in this district.

10.3.4 Disaster Risk Reduction

Disaster risk reduction is the concept and practice of reducing disaster risks through systematic efforts to analyse and reduce the causal factors of disasters. The process of disaster risk reduction is divided into four stages.

10.3.4.1 Mitigation

The mitigation phase occurs before a disaster takes place. This phase includes actions taken to prevent or reduce the cause, impact, and consequences of disasters. Examples of hazard mitigation include:

1. Clearing space around buildings to create a defensible space against fires
2. Adding levees or improving property drainage to protect from flooding
3. Securing furniture to floors and walls to help prevent damage/injuries during earthquakes
4. Re-locating structures to less disaster-prone areas
5. Buying insurance policies.

10.3.4.2 Preparedness

This phase includes planning, training, and educational activities for events that cannot be mitigated. Examples include:

1. Developing disaster preparedness plans for what to do, where to go, or who to call for help in a disaster
2. Exercising plans through drills, tabletop exercises, and full-scale exercises
3. Creating a supply list of items that are useful in a disaster
4. Community awareness in disaster prone areas.

10.3.4.3 Response

The response phase occurs in the immediate aftermath of a disaster. During the response phase, business and other operations do not function normally. Personal safety and well-being in an emergency and the duration of the response phase depend on the level of preparedness. Examples of response activities include:

1. Implementing disaster response plans
2. Conducting search and rescue missions
3. Taking actions to protect yourself, your family, your animals, and others
4. Addressing public perceptions about food safety

10.3.4.4 Recovery

During the recovery period, restoration efforts occur concurrently with regular operations and activities. The recovery period from a disaster can be prolonged. Examples of recovery activities include:

1. Preventing or reducing stress-related illnesses and excessive financial burdens

2. Rebuilding damaged structures based on advanced knowledge obtained from the preceding disaster
3. Reducing vulnerability to future disasters

10.3.5 Disaster Mitigation Model – Crunch and Release Model

The disaster Crunch and Release Model states that a disaster happens only when a hazard affects vulnerable people. A disaster happens when these two elements come together. A natural phenomenon by itself is not a disaster; similarly, a population maybe vulnerable for many years, yet without the “trigger event”, there is no disaster. We can therefore see that vulnerability - a pressure that is rooted in socio-economic and political processes - is built up and has to be addressed, or released, to reduce the risk of a disaster. These processes may include poverty, age-related discrimination, exclusion or exploitation based on gender, ethnic or religious factors. The outcome will be “safe” as opposed to “unsafe conditions”, “resilient or capable communities” as opposed to “vulnerable communities” and “sustainable livelihoods” as opposed to “unsustainable livelihoods”.

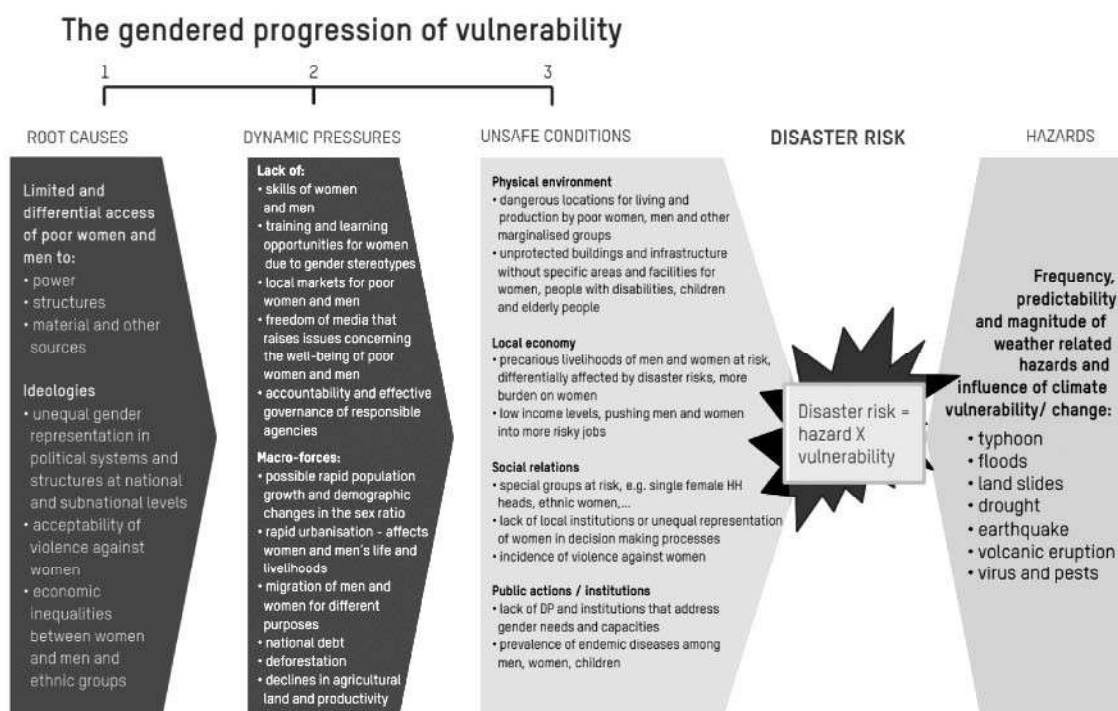


Fig. 10.2 Crunch Model

10.3.5.1 Release

Theoretically, the “pressure” between hazards and vulnerabilities should be released to reduce disaster risk. Hazards should be mitigated to reduce their intensity, thus affect vulnerable population less. Vulnerability should also be reduced at different levels: activities need to be undertaken to turn “unsafe conditions” into “safer conditions”, “dynamic pressures” will be reduced and “root causes” will be addressed. These DRR activities aim to achieve a controlled

situation and a resilient community, where there is no loss of life, few casualties, restricted damage, food security and capacity to recover quickly from any impact of a hazard.

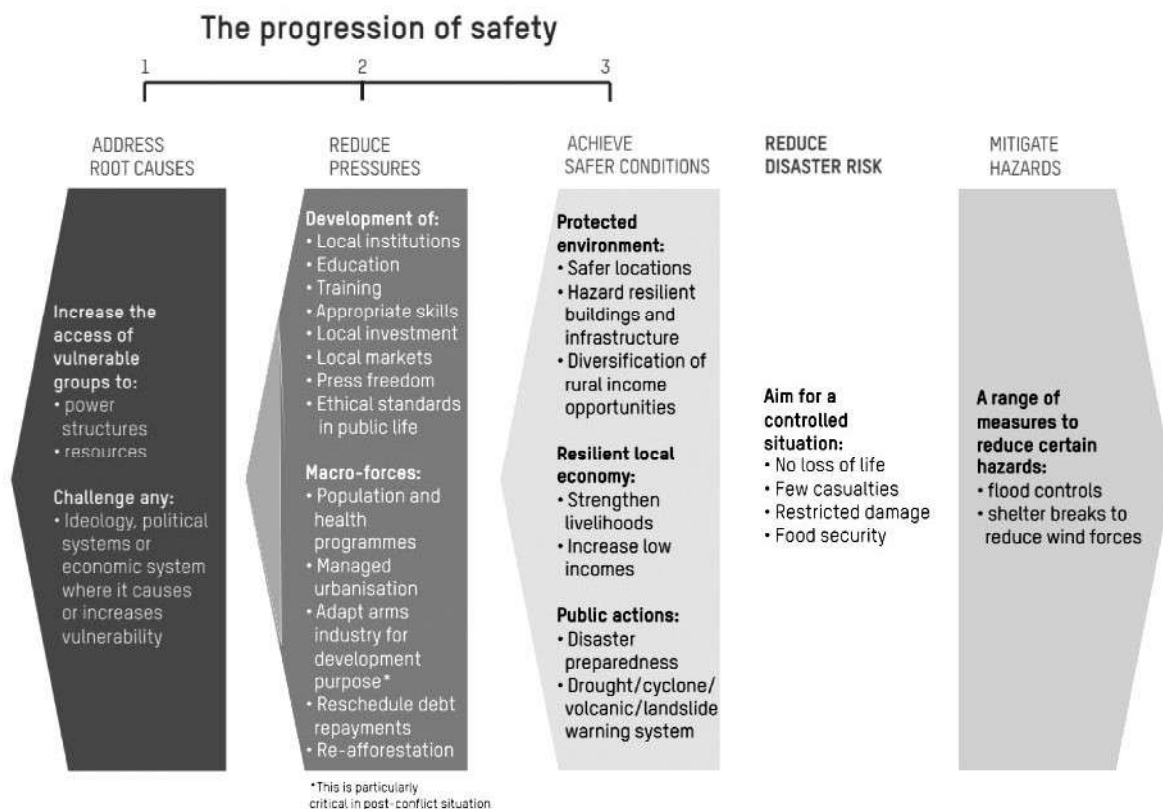


Fig. 10.3 Release Model

10.4 Disaster Vulnerable Area Mitigation Plan

Any disaster management plan or emergency management plan consists of four phases, namely: Mitigation, Preparedness, Response and Recovery. The mitigation component in an emergency management plan is aimed at reducing the risk, impact, effects of a disaster. Hence careful planning in the mitigation phase is important to reduce or eliminate the long-term risk to human life, property from natural and manmade calamities. It's important to mitigation plans led by local community, working together to identify, plan for in the event of a disaster and reduce vulnerabilities and promote long term personal and community resilience and sustainability. Mitigation plans can concentrate on both pre-disaster and post disaster efforts to reduce the impact of the disaster. Pre-disaster Mitigation should focus on projects and interventions to address natural and man-made disaster to reduce risk to the population and property. This is mainly achieved by strengthening the resilience of National/State Infrastructures. Post-disaster Mitigation efforts are primarily designed to reduce future damage in an affected area and decrease the loss of life and property due to the incidents following the disaster. Jorhat region is more prone to floods, than any other natural disasters hence the disaster vulnerable area mitigation plan focuses on flood and cyclone related eventualities and how can it be mitigated and have a better preparedness. It is important to note that disaster management is an integrated task involving various government departments of region and the plan should focus on prevention, preparedness, mitigation, response, and relief measures.

10.4.1 Prevention Plan

As part of prevention of the said natural disasters, the following measures can be adopted by concerned government departments to avoid and minimize the impacts of natural disasters.

1. The Water Resource Department should monitor the major water bodies like rivers, streams, lakes for constant flow of water, rising levels, and identify potential areas along the water bodies which need additional embankment or revetments, and these works should be implemented on priority before the onset of the season.
2. Power and Communication should carry out through inspection of power lines, communication lines for defects and rectify them. Trees and branches which may damage power and communication lines should be trimmed or removed.
3. Health department should ensure that the primary practice upon triage and community health centers are equipped with medicines and medical staff. Preventive vaccines for epidemics should be stocked in adequate quantity. Chlorination of drinking water should be ensured to avoid the outbreak of epidemics in the event of cyclones and floods.
4. The Department of District Disaster Management Authority is the nodal agency in the Jorhat region and has already handled several flood and cyclone situation in the region. From this experience, it should be able to identify the low lying and vulnerable areas and the population of such places must be warned to be alert and to be ready to move to the cyclone shelters or to safer areas or to the relief camps in case of warning of disaster.
5. The Department of Civil Supplies & Consumer Affairs should decide for creation of buffer stock of food grains by making required withdrawal from the Food Corporation of India. Also, adequate quantities of Kerosene and diesel should be procured and made available through the Fair Price Shops.
6. Department of Agriculture should take steps to publicise precautionary measures to be taken to save the standing crops in the vulnerable areas.
7. Farmers should be encouraged to have platforms in their fields to stock the crops. Desilting of public and private irrigation channels should be ensured for quick drainage of paddy fields.
8. Fisheries & Fishermen Welfare Department shall alert all the riverside villages and hamlets about the impending natural calamity and advice the fishermen not to venture into sea till normalcy is restored.
9. Department of School Education shall keep all schools ready for accommodating the evacuees and keep the Central Kitchens to function around the clock with in charge of the centres. NCC and NSS students shall also be grouped to send them for relief works and evacuation mockdrill practice in school.
10. Transport Department should keep ready the list of sufficient numbers of earthmoving vehicles, transportation vehicles such as trucks, tractors, tippers, mini buses etc. Further, all the listed vehicles allocated in connection with calamity has to be kept in roadworthy condition for using them in emergency.
11. Fire Services Department and State Disaster Response Force shall keep available sufficient number of rescue materials, like life jackets, buoys, ladders and ropes.

12. Similarly, the Fire Services Department shall set up Search & Rescue Team consisting of at least 6 members of each Fire Service Station.
13. Department of Animal Husbandry & Animal Welfare should store fodder, cattle feed, poultry food etc. and also carry out the inoculation of animals against epidemics. The Key Village Units should harbour stray cattle with shelters.
14. Local Bodies shall make arrangements for availability of Generators and pump sets at short notice. For areas with waterlogging Local bodies should clear the L & U type drains which normally clog due to plastic materials and silt.
15. The Police Department shall set up a Search & Rescue Team which shall contain at least 20 Police Personnel for each jurisdiction of the Superintendent of Police.
16. Identification of hazardous locations in different Circles is to be done and marked on the map. Basically, these locations are found prone to fire, earthquake, and artificial flooding. Fires found to be spread out mostly as a result of narrow roads while artificial flooding because of poor drainage pattern. Master Plan of Drainage pattern is to be completed by Town & Country Planning. Disaster Management Plan should be prepared by all concerned departments as per Disaster Management ACT 2005.
17. There are 2 types of majors Structural and non-structural i.e., Steps are to be taken to mitigate the problems out of erosion in the banks of Brahmaputra, Fire & Earthquake and Training of Village Land Management and Conservation Committee Members (VLMCC) on preparation of Village Master Plan and Constitution of Ward Disaster Management Committee in 19 wards of Jorhat Municipal Board and follow up action
18. The activities of different line departments to save the life of people and properties in accordance with disaster management cycle. Police departments, Police control room, Wireless facilities, Fire and emergency services and civil defence and home guard.

Table 10.3 Structural and Non-Structural Measures for prevention of a Disaster

Sl. No.	Structural measures	Non-structural measures
1	Installation of Water Collection Deep Tube Well Pumps at five selected sites to be used for firefighting purposes	Training of Village Land Management and Conservation Committee Members (VLMCC) on preparation of Village Master Plan
2	Water Pumps to install in identified locations to pump out logged water	Constitution of Ward Disaster Management Committee in 15 wards of Jorhat Municipal Board and follow up action
3	Construction of Wooden Boat to be used for rescue purposes	Public awareness programmes on Safe Construction Practices & Earthquake Preparedness in different wards of Jorhat
4	Redesign existing storm water and drainage systems in flood prone areas	Training of Doctors on Emergency Health & Mass Casualty Management (TRIAGE)

5	Erosion protection works in vulnerable reaches along the bank of river Brahmaputra, Works to strengthen the embankment	Increase public awareness of flood hazard and mitigation possibilities
6	Undertake structural safety audit of lifeline buildings and schools	Training of Engineers on Rapid Visual Screening, Workshop on Earthquake Risk Mitigation and Management
7	Undertake structural safety audit of Shopping, Malls, Nursing Homes, multistoried buildings	Training of Task Force Members (Quick Response Team) on Search, Rescue and First Aid
8	Map locations of all key buildings in the district and rate them on the basis of rapid visual screening exercise/ Non-Destructive (ND) Test	Earthquake Shakeout programme in schools
9	Undertake retrofitting of key lifeline and critical/ social infrastructure	Training of Principal/ Head Masters of HS/High/ME/LP schools on School Safety & Disaster Management
10	Adopt zoning parameters as identified in the Model Building Byelaws issued by MHA (Sept. 2004)	Mock exercises in several locations
11	Fire Safety Audit of Shopping Malls, multistoried buildings as per underlying norms National Building Code	Training programmes on Disaster Management conducted for the officers & staff of different vital Govt. establishments
12	Enforcement of National Building Code/Indian Standard Code of Practice (BIS) and Assam Notified Urban Areas (Other than Guwahati) Building Rules, 2014	Disseminate alert and warning mechanisms of flood early warning system (FLEWS) project to communities (preferably through VLMCC)
13	Conduct detail flood hazard mapping of the District	Promote flood insurance
14	Map all infrastructure at risk to varying intensity of flood hazard	Disseminate flood hazard mapping information to stakeholder
15	Identify areas prone to sediment built up and measures to take up	Undertake Undertake Mock Drill on flood rescue

Source: National Disaster Management Authority

10.4.2 Mitigation and Preparedness Plan

Pre disaster planning consists of activities such as disaster mitigation and disaster preparedness. Disaster mitigation focuses on the hazard that causes the disaster and tries to eliminate or drastically reduce its direct effects. The best example of mitigation is the construction of embankments and construction of proper drainage system in flood prone areas to avoid floods. The other example includes retrofitting of weak buildings to make them earthquake resistant.

And preparedness focuses on plans to respond to a disaster threat or occurrence. It takes into account an estimation of emergency needs and identifies the resources to meet the needs. The first objective of the preparedness is to reduce the disaster impact through appropriate actions and improve the capacity of those who are likely to be affected most. The second is to ensure that ongoing development continues to improve the capacities and capabilities of the system to strengthen preparedness efforts at community level. Finally, it guides reconstruction so as to ensure reduction in vulnerability. The best example of preparedness activities are the development of community awareness and sensitization system through community education and administrative preparedness by way of stockpiling of supplies, developing emergency plans for rescue and relief.

For a successful mitigation plan it is necessary to identify short-, medium- and long-term mitigation measures for various hazards for structural and non-structural risks and damages. Mitigation measures should focus to reduce both the effect of the disaster and the vulnerable conditions to it, in order to reduce the scale of a future disaster and its impacts. Mitigation measures should also focus at reducing physical, economic and social vulnerability of the region at the event of the disaster. Cyclone mitigation and preparedness largely hinges on the preparedness of the community. The following steps can be taken to reduce the risk in the unfortunate event of the said natural disasters.

10.4.3 Restore Communication networks

1. The task force in association with Fire Service, State Disaster Response Force (SDRF) & Civil Defence should thoroughly search the affected area for survivors and injured.
2. In case of heavy flooding and inundation, vehicular access may be restricted and hence suitable rafts/ boats should be used to rescue and evacuate the people affected by the floods.
3. The waterlogged in low lying residential areas should be pumped out and the pumped-out water could be let through the nearest natural drain or canal. Also, fire engines can be deployed to pump out water from affected areas during emergencies.
4. Any breach in rivers, streams or natural drains should be protected with adequate sandbags or creation of temporary embankments to avoid further damage to property and human life.
5. In case of heavy storms, power supply to areas which are in the primary path of the storm can be disconnected to avoid hazards due to breakage of power lines. Provisions should be made to provide generators for temporary power supply to storm affected areas.
6. Relief camps should be opened in appropriate locations where a large number of people are affected.
7. Health facilities like General hospitals and Medical Colleges should be ready to accept crowd in case the primary health centers gets overcrowded.

10.4.4 Response Plan

Response measures are those taken immediately prior to and following disaster impact. It is important to have clear organization structures with established line of authority within the government mechanism to handle the response plan in case of natural calamities. The plan should detail out the various phases from early warning to rehabilitation and the roles that agencies play in reaching the vulnerable and affected to identified disaster support infrastructure located in the Jorhat region. Response plans include formation of functional teams and providing plans for transportation, evacuation, search and rescue, and rehabilitation. They are supported by supervisory zone-based teams assuring food, shelter, water, medicine to the vulnerable to uphold physical and psychological health. Survey and assessment should be the part of response activity.

Table 10.4 Response at District Level

Sl.No	Response at district level	
1	<p>On receipt of Flood Warning, DDMA will pass the information for taking necessary measures to:</p> <ul style="list-style-type: none"> • The concerned SDO (Civil) • Revenue Circle Officer • Suptd. of Police • Executive Engineer WR Dept. • Executive Engineer, PWD(Roads) • Station Officer-Fire Service Station and I/C of State Disaster Response Force (SDRF)/National Disaster Response Force (NDRF) if stationed in the district. • Deputy Director, F&C Supplies • Jt. Director Health Services • District Veterinary Officer to take necessary measures so that, if necessary, assistance can be provided in short notice to the affected areas • DIPRO, if requires giving public announcement for evacuating people from vulnerable areas. 	Deputy Commissioner (DC) will direct Addl. DC or CEO, DDMA
2	SP will instruct Senior Station officer, Fire and Emergency Services/SDRF to assist the Circle Officer in rescue, evacuation and relocation processes	Superintendent of Police (SP)
3	Senior Station officer, Fire and Emergency Services will mobilize teams of SDRF and boats available in their custody and coordinate with DDMA/Circle Officer for response.	Snr. Station officer, Fire and Emergency Services
4	Executive Engineer, WR Dept. shall mobilize man material to strengthen weak embankment, keep constant vigil on Water Levels & and take necessary temporary measures to avert any breaches in embankments.	Executive Engineer, WR Dept.
5	Take adequate measures to ensure that the road communication is not disrupted; repair any breaches on roads for evacuation and supply of relief to the affected people.	Executive Engineer, PWD (Roads)

6	Jt. Director Health Services on receipt of information will initiate to mobilize medical response team, ambulances and alert all government hospitals in the area likely to be affected. JD shall also direct SDMHO and I/C PHC of the concerned area to form a team of doctors equipped with necessary medical equipment and move to the affected places or Relief Camp/centre as required by the Circle Officer	Jt. Director Health Services
7	Take periodic report of the situation and instruct Circle Officers, Jt. Director Health Services, Executive Engineers of PWD (Roads), PHE, WR, Irrigation, Police, Fire & Emergency Services to take necessary measures as required for dealing with the	Deputy Commissioner
8	Deputy Commissioner will also inform State HQ about the prevailing situation and actions taken	Deputy Commissioner

Source: Disaster Mitigation and Management Plan, ASDMA

Table 10.5 Response at Circle Level

Sl.No	Response at revenue circle level	
1	On receipt of warning, mobilize the Lot Mondal, Gaon Burah, SDRF and other agencies and resources available under Circle Officer's jurisdiction	Circle officers of the Concerned Revenue Circle
2	Go to the specific location immediately and inform the villagers on the probability of any flood event and ask them to take necessary precautionary measures	Lot Manadal and Gaon Burah, Field Officer (Disaster Managment)
3	In case of probability of high intensity flood, evacuation of people from vulnerable areas to pre-identified safe locations and preposition of quick Response Team/SDRF/NDRF/Police Force/Sand Bags/ Boats/Tarpaulin/ Tents)	Circle Officers (COs) of the concerned Revenue Circle, Inland Water Transport (IWT) Dept.
4	Keep DC/SDO (Civil) informed on an hourly basis about the situation on the ground level and may request additional resources of man, material and machines if required from DC or SDO (Civil)	Circle Officers (COs) of the concerned Rev. Circle
5	Inform: Block Development Officer (BDO), so that BDO can inform PRI representatives for appropriate action GP Secretary and GP President for appropriate action	Circle Officers (COs) of the concerned Rev. Circle
6	Open Relief Camps if required and give requisition for GR to DC	Revenue Circle Officer
7	Arrange for distribution of Relief Officer	Revenue Circle

Source: Disaster Mitigation and Management Plan, ASDMA

10.5 Relief Plan

10.5.1 During the Disaster.

Disseminate the warning of disaster from DEOC / DIPRO to all concerned destination in single attempt by using mass SMS, announcement through radio, through mass voice mail and ask the people who are likely to be affected, to take shelter in safer places. Immediately deploy the forces to clear the route of search & rescue and also to clear the traffic from the route of rescue. Command to the forces, NGO, SHG & volunteers to rush immediately to the affected area for search and rescue with all pre-enlisted tools and equipment for disaster.

During the time of occurrence of disaster, the Nodal Officer shall liaise with all Head of office, Public Leaders and others organizations and initiate prompt measures to prevent loss of human lives and property damage. The Nodal Officer shall initiate immediate necessary measure for evacuations, organize Search and Rescue teams with consultation with the concerned Member which have been entrusted to this work. If necessary, the Nodal Officer will initiate setting up of Relief Camp for the affected people in a safer place and ensure proper supply of safe drinking water, electricity, medical facilities and rations etc. with the help of concerned departments to the relief camp.

10.5.2 Post Disaster

A Post- disaster evaluation should be done after the withdrawal of relief and rehabilitation activities in order to assess:

1. The nature of state intervention and support,
2. Suitability of the organizational structure,
3. Institutional Arrangements,
4. Adequacy of Operating Procedures,
5. Monitoring mechanism,
6. Information tools,
7. Equipments,
8. Communication System, etc.

The impact studies on the aforesaid operations for long term preventive and mitigation efforts are to be undertaken. Evaluation exercises may be undertaken to understand the perceptions about disaster response in terms of:

1. Adequacy of training
2. Alert and warning system,
3. Control Room functions,
4. Communication plans,
5. Security,
6. Containment,
7. Recovery procedures,
8. Monitoring

10.5.3 Recovery

In the unfortunate event of a natural calamity like a cyclone or flood its important focus on the methods and activities to restore lifeline support physical infrastructure like adequate water supply, power and communication networks, accessibility to the site. These must be the described in the disaster management plan- relief & recovery part.

In the District, the Nodal agency plays direct and active role in relief. The Deputy Commissioner office either directly or through assistance will inform to the nearest police stations, WT stations, administrative officers and nodal agencies at Circle, Sub-Divisional and Dist. HQ by quickest means. For timely assistance to the people affected by natural disasters it is necessary to have correct assessment of extend of damage to crops, public & private properties and loss of human lives and livestock. The emergency relief measures and relief measures in the aftermath of a disaster is generally carried out in compliance with Calamity Relief Fund Norms by Deputy Commissioner.

The task force is responsible for collecting the extend of the damages with respect to number of houses damaged, loss of human lives, number of people injured, information about individual families, their income, property and assets. The zonal officer has to prepare a report on the same to be sent to the Deputy Commissioner. The mentioned assessment is to be carried out on priority basis so that the Nodal Department in the district Region which is the Department of Disaster Management can extend relief assistance in time in order to mitigate the effect of the natural disaster.

10.5.4 Relief Plan for Flood

Pre-Flood

1. Maximum number of relief centres likely to be set up Facilities to be available at each centre
2. Maximum likely number of relief parties the way individuals and voluntary organizations are to be associated with the relief teams.
3. The way Panchayats will be associated with relief operations. Divide the district into compact zones each comprising a group of villages falling under both 'very vulnerable' and 'vulnerable' areas as classified in DDMP and each such zone shall be serially numbered Select sites for evacuation centres and relief centres in safe areas. The site for sheltering livestock may be decided in consultation with the district A. H. & Veterinary officer. In selecting sites, preference shall be given to high lands, schools, marketplaces, and places not likely to be inundated.
4. Make a rough estimate of requirements. Prepare a sub-division wise list of officers and staff available for deployment of relief duty as and when called for.
5. A list of jeeps, buses, trucks and other vehicles for requisition in case of necessity, in consultation with the D.T.O.

During Flood

1. DDMA will conduct weekly meeting to review flood management during the flood season. On receipt of flood warning the Deputy Commissioner will take action as per Standard Operating Procedure (SOP) prepared by the State on occurrence of Flood, he will visit the places of occurrence, ascertain the nature and extent of flood and make prompt operational decisions, ADC (Relief) will arrange proper distribution of relief

articles received as donation in kind among the deserving affected people through the official and non-official agencies.

2. Circle Officer will arrange for taking care of the infirm, destitute, orphans, children, and expectant/nursing mothers in the relief centres through the assistance of the distribution social welfare officer.

Post Flood

1. DDMA will collect agricultural statistics from the revenue staff and the district agricultural officer about areas under crops affected by flood, damage to crops and the number of cultivators involved.
2. After the flood recedes, a report on losses and damages of each area needs to be submitted the Government in the Revenue & Disaster Management Department in the form as given in Appendix X of Assam Disaster.
3. Generally, full pictures of relief measures will emerge as soon as the waters have subsided. In declaring closures of relief operation, it will take the approval of the DC and inform all concerned.

10.5.5 Departmental roles and responsibilities

Police department

In order to achieve smooth and orderly evacuation of human lives and properties the district Police Department has to play vital role. The Police Department will keep close liaison with Deputy Commissioner/ Addl. Deputy Commissioner (Disaster Management) and the District Emergency Operation Centre (DEOC). The Superintendent of Police will chalk out action plan forming different zones and sectors with Police Zonal & Sector Officers for smooth conduct of rescue and relief operation. The Zonal and Sector Police Officer will keep close liaison with the District Headquarter as well as concerned departments like Fire Service, Civil Defence, Health, Army & Paramilitary, Air Force, Transport, and ensure the following tasks.

1. Visit the affected areas and keep informed through wireless system/telephone etc. about the up-to-date status of the affected areas and prompt actions to be taken for rescue and relief operations.
2. Take adequate care for maintaining law & order. They also assist the Civil Administration in times of Disasters
3. Round the clock vigil of the area including the high and vulnerable buildings and ensure rescue operations at every affected areas/houses
4. Requisition of services of Civil Defence, Homeguards/VDPs and other military/paramilitary forces in rescue operations 21
5. Provide assistance to the community for shifting of affected and injured persons to the health camp for medical treatment.
6. Extend support to Fire & Emergency Services in controlling fire incidents and security to individuals and public properties
7. Establish emergency communication system
8. Extend support to Civil Administration in management of dead

Fire & Emergency Service

Fire (natural as well as manmade) is one of the major disasters that causes loss of human lives and property. Sometimes not because of earthquake, but because of fire people lose their lives. Ensure that proper firefighting precautions has been taken while issuing permission for construction of buildings.

Make sure that smoke detectors/ firefighting equipment are installed in all important places like Govt. offices/ schools/ colleges/ cinema halls/ industrial units and other installations where the people gather in large number. Also train up employees about the techniques of using fire fighters. Make sure that sufficient number of fire tenders with all the equipments in working condition are available round the clock.

Train up/ Motivate people how to use fire fighters and its advantages.

Carry out Fire Mock Drill in schools/ public places/ apartments etc. to raise public awareness.

State Disaster Response Force Services

Sometimes not because of fire, but because of flood/earthquake etc. people lose their lives. SDRF People will be in alert mode with all lifesaving equipments/ boat and extend their services as and when required. They will work under the command and control of Sr. Station Officer, Jorhat Fire & Emergency Services Station.

Civil Defence & Home Guard

For effective operation, works of various services, personnel must have proper training and discipline with a view to achieve this intensive training with special reference to the earthquake disaster should be arranged to train up the volunteers and 23 other related personnel as well as the public. The efficiency in performance of the various services depends highly upon the amount of training imparted to them. In Civil Defence towns, training with special reference to earthquake are already introduced in educational institutions. It is suggested to conduct some exercises by Civil Defence department, in the rural areas to enlighten the public and students for their action and part played in a disaster. Civil Defence Department will keep a register of trained volunteers so that their services can be utilized in disaster relief operation in respective service. The Deputy Controller of Civil Defence, Jorhat will properly maintain the equipments necessary for conducting rescue operation to extricate the casualties trapped from under debris. He will also ascertain the resources of manpower and materials available with the local Agencies like Home Guard, and other Local voluntary organization such as Indian Red Cross Societies, N.C.C., and Scouts & Guides Etc. Civil Defence and Home Guard, Jorhat will have to prepare a separate contingency plan for this purpose. They need to spare sufficient numbers of Home Guards for emergency operations as and when called for.

Health Department

The Health Department will make necessary arrangements for blood banks and other lifesaving emergency services. All Hospitals and Private hospital should be on alert. One senior Doctor for emergency duty should be detailed on a round-the-clock basis in the Casualty Ward in these Hospitals. Ambulances with life saving drugs need to be kept in readiness. An inventory of all private ambulances should be prepared along with the names of the drivers and their contact phone numbers. Provide health and medical care in normal and disaster situations.

Develop adequate health infrastructure in the district and implement programmes towards improvement of health across all sections of the society.

The Health Department shall conduct vulnerability assessment of all health facilities across the district and undertake preparedness and mitigation measures as given below.

1. Render immediate medical service and transport casualties to hospitals
2. Activate Hospital Disaster Management Plan including mass casualty plan
3. Prioritize patient management; Activate triage system as per the established protocol
4. Set-up relief camps from District to PHC Level, Medical Colleges.
5. Establish a base for field hospitals along with basic/support services
6. Maintain Ambulance network
7. Establish network among medical practitioners/ health institutions to facilitate quick mobility of doctors and mass casualty management.
8. Ensure that emergency communication is functional at all times, including medical services (pharmacy, blood bank, paramedics, ambulance services).
9. Conduct training to Hospital Administrators, Doctors, Nurses, Paramedics, and other staff.
10. Work towards developing a cadre of volunteers trained in basic first-aid
11. Provide support in recovery operations
12. Carry out impact assessment on health infrastructure
13. Provide support to line departments in Recovery and Rehabilitation efforts of the communities.
14. Provide expert counselling/psychosocial support to disaster survivors
15. The Jorhat Medical College and Hospital will keep few beds ready for treatment of the referred cases. The staff will help with manpower and medicines, vehicles and voluntary Blood Donors.
16. Document actions taken by the department and incorporate lessons learnt in the sector plan.

Public Works Department

Structural safety of all existing RCC, Steel and masonry buildings needs to be assessed with regards to its safety against potential hazards like earthquake, floods, fires and accidents. The PWD (Bldg.) division has to prepare and provide checklist for regulatory and development authorities. The PWD (Bldg.) division has to identify vulnerable buildings for seismic safety in compliance with Govt. of India guidelines. They have to create, compile and maintain a database of all weak structures (Govt./ Non- Govt. and lifeline buildings) and provide technical support for the corrective measures to follow like retrofitting/demolishing of such structures.

The PWD (Bldg.) division will provide technical assistance to the DDMA for enforcing BIS codes as applicable in the district. The DDMA may take necessary actions against deviation/ violation of such resistive measures. PWD (NH) & PWD (State Roads) will make an inventory of the machineries like Bulldozers, Excavators, Cranes etc. necessary for restoration of roads.

Construction and repair of roads, bridges, culverts in the district. The departmental Engineer should keep vigilance on the NH and all other important road during and immediately after the earthquake and take immediate measures to clear the blockade found anywhere using the required machineries like bulldozers etc.

The following measures shall be taken by the department:

1. Preposition emergency supplies and equipment/tools in high-risk concentration areas
2. Establish mitigation funds within the department.
3. Undertake damage assessment of lifeline infrastructure; Prepare estimates and undertake repair/ strengthening works; Supervise the civil work activities and ensure safe construction practices are streamlined during Recovery/Reconstruction phase.
4. Conduct training for staff in latest advancements of engineering, demolition techniques, health monitoring of infrastructure assets, seismic strengthening and retrofitting, critical infrastructure protection.

Public Health Engineering Department

PHED shall undertake the following measures.

1. Water borne diseases are one of the major reasons of increasing the number of deaths after any disaster. Providing purified water to the affected people is a challenge. The PHE department plays a vital role in this regard. Checklists for this department are as follows,
2. The PHE department, Jorhat will have to keep sufficient stock of water purification materials like bleaching powder, alum and lime etc. for carrying to the area where necessary and depute their field staff whenever disaster situation claims.
3. The PHE Engineer staff will keep in constant touch with the Zonal Officers during and after the disaster. Ensure safe hygiene through Total Sanitation Campaign (TSC).
4. Motivate the people to exercise proper disinfections and hygiene practices for drinking water and taking food.
5. Undertake risk assessment and management of ground water resources in emergency situations.

Water Resources Department

The Water Resource Department will assess and make a list of vulnerable dykes and keep close eye on these areas. Accordingly, they will have to prepare contingency plan to meet any emergency. The Executive Engineer is to check regularly the condition of the sluice gates and do necessary rectifications, if any, so that stagnant water can be discharged effectively. He is responsible for deploying officials/ experts along the dyke/bundh etc. during the flood period at the vulnerable points and send their contact numbers to DDMA and zonal officers. The WR Department has to keep sufficient number of empty gunny bags, sand and other facilities in the vulnerable reaches. In addition to this they have to deploy strict vigilance over all the major embankments round the clock.

Irrigation Department

The Executive Engineer is to keep sufficient nos. of portable pump sets ready on 24x7 hourly basis. He will arrange sufficient manpower and assign duties likewise.

Transport Department

Proper maintenance/cleanliness of roads during disaster is an important task so that rescue/relief operations, transportation of essential goods & manpower are not affected. A checklist for Transport Department is as under:

1. The DTO Jorhat will keep list of owners with contact details of all type of vehicles Excavators, Bull-dozers, Cranes. Recovery Vans Tractors, buses, trucks etc. which can be arranged immediately during and after any disaster. A copy of the same is to be made available to the District Disaster Management Authority.
2. Arrange vehicles for transport of people and relief supplies, navigation aid.
3. The Transport Department will have to prepare an Action Plan for supply of the all type of vehicles when required. The DTO would have to keep liaison with the DEOC.
4. Take up awareness program for road safety (Accident prevention).

Food and Civil Supplies Department

They are responsible for proper and quick distribution of Civil Supplies at the time need. They will ensure procurement of essential commodities (controlled & noncontrolled) and maintain buffer stock of sufficient quantities to be released during necessity. They are also to issue instructions to the Roller Flour Mills to keep rolling stock of wheat bran/ rice barn and send regularly a list displaying availability of these 28 items. The F&CS department has to keep constant vigil so that traders do not take advantage of the situation creating artificial scarcity of commodities and inflate prices.

Veterinary Department

Disaster causes death and injury to animals also. The veterinary Department with the assistance of NGOs/ volunteers working in this line will organize in such a way that can expeditiously take steps for rescue of seriously injured animals and disposal of dead animals also. District Veterinary Officer will assess requirement of equipment's and other veterinary staff, medicines vaccines disinfectants etc. and prepare an Action Plan to combat the possibilities of injuries and epidemics etc. They will conduct assessment of damage and economic loss due to disasters within the sector.

Agriculture Department

During flood/draught, loss to seasonal crops is considerable. The Agriculture Department is entrusted with provide necessary technical support to the district administration. Establish coordination in implementing and providing technological know-how on drought management to the farming community through agricultural extension services. Continue educating farmers on soil and water conservation technologies through implementation of watershed projects and know-how of drought resistant crops. The following measures shall be taken by the Department:

1. The Agriculture Department will make an assessment of acreage under crops and number of cultivators to be affected in each of the areas.
2. They need to assess the requirement of seeds, seedlings, manures etc. for grants, tools and plants for emergency relief works.
3. They have to advice on the suitable cropping pattern. Arrange for spraying of pesticides wherever necessary.
4. Make sufficient stock of seeds, manures, implements etc. and make arrangements for raising seedlings.
5. Arrange distribution of agricultural inputs in consultation with the district administration.

6. Render technical support to the needy cultivators for salvage and protection of surviving crops.
7. Repair the damaged tools and plants.

Social Welfare Department

During any disaster the weakest & neglected section of the community viz. women, children, senior citizens, physically handicapped suffer the most. It is the responsibility of our society to protect them.

1. The Social Welfare Department has to make arrangement for mobile maternity and child welfare centres wherever necessary.
2. Access the requirement of baby food etc. and arrange them. They have to extend help for taking care of orphan 8s mother, and the sick.
3. Maintain in directory of all social welfare organizations located in the district and made it available to the DDMA.
4. Alert personnel for floods on receipt of warning and kept constant touch with the district administration All heads of the Departments/Offices will keep constant touch with the District Officials/Disaster Emergency Operation Centre at DC's office. Every department will have to prepare separate Action Plans showing the Standard Operating Procedures (SOPs) to be adopted on emergency and Resource Inventory (human & material) and made it available with the DDMA, Jorhat.

Inland water Transport

The Inland Water Transport Department is committed to ensure safe journey to the ferry commuters across the state and cargo transportation through inland waterways on the river Brahmaputra. The IWT also look into the fitness and safety measures in private boats. During the flood they play crucial role in providing relief material in *chor* areas. The IWT also made an inventory of local boats and create awareness among boats owner's and staff towards disaster preparedness.

City Disaster Mitigation Plan

The points mentioned above should be part of a larger city or region level disaster management plan. The Disaster Management Act, 2005 has brought a change from Response & Relief oriented approach to proactive and comprehensive approach. This has encouraged many Indian cities to develop and formulate a City Disaster Management Plan, the same should be worked for GJRMP area as well to enable it to be better prepared in the case of natural disasters in the future. As part of the Master Plan 2041 the authority feels there is a need for a CDMP for the planning area covering the following general principles:

1. Risk & Hazard Assessment
2. Planning
3. Organization
4. Resource Utilization
5. Need for Specialist
6. Training

Generally, the CDMP prepared for the planning area should include sectoral plans covering the following aspects of disaster & emergency management:

1. Overall Preparedness
2. Rehabilitation
3. Emergency Response
4. Prevention
5. Mitigation
6. Recovery
7. Reconstruction
8. Capacity Building Plans

Based on the above discussed general principles a detailed City Disaster Management Plan (CDMP) for Greater Jorhat Revised Master Plan Area have to be prepared for strengthening the institutional mechanism.

ANNEXURE I

Profile of the Department

This is a district office under the Director, Town and Country Planning, Dispur, Guwahati-6 (Urban Development Department). The office is situated at Jorhat town in Unnayan Bhawan, in front of DC, Jorhat Office Complex.

Departmental works

1. Preparation of Master Plan.
2. Implementation of schemes related to Central and State Govt. fund for infrastructure development.
3. Monitoring of schemes sanctioned by Central and State Govt. being implemented by Urban Local Bodies of the district.

Office Building

It is a G+3 Rented R.C.C. structure.

Status of employees

Sl.No	Staff strength & pattern	Total	Male	Female
1	Deputy Director	1 (1 vacant)		
2	Asstt. Director	1	1	Nil
3	Asstt. Engineer	1	1	Nil
4	UDA	1 (1 vacant)	1	Nil
5	LDA	3	1	2
6	Junior Engineer	4 (1 vacant)	3	Nil
7	Draftsman	3	2	1
8	Tracer	1 (1 Vacant)	Vacant	Nil
9	Research Assistant	VRS accepted from March 2022	1	Nil
10	Investigator	1	1	Nil
11	Mohurrir	1	1	Nil
12	Driver	1 (1 vacant)		
13	Grade IV	6	6	Nil
	Total	18		

There are 18 employees in this office as of now, out of which 3 are female.

Standard Operating Procedure (SOP)

1. Written guideline that precisely defines how operations are to be carried out.
2. An organizational directive that establishes a standard course of action.
3. Written guidelines that explain what is expected and required of the personnel.
4. Standardization of activities
5. Identify planned and agreed upon roles & actions.
6. Promotes coordination and communication amongst personnel.
7. Simplify decision making during potentially stressful conditions.

Emergency Support Function (ESF)

	Name of the Head	Designation
1.	DEPUTY DIRECTOR, T&CP, JORHAT	NODEL OFFICER (EXECUTION OF SOP)
2.	ASST. ENGINEER, T&CP, JORHAT	EXECUTION OF SOP & SUPERVISION OF ESF 1 & 2

Damage Assessment

The team consist of technical person as mentioned in ESF 1 will do the rapid damage assessment in post disaster as per Annexure II.

ESF 1 - Damage Assessment & Monitoring Team (DAMT)

Sl. No.	Particulars	Contact no.	Villages & Ward Nos.	Remarks
1	AE		Jorhat East & West Circle villages	The officials will assess the ground situation in their respective areas and report to control room
2	JE 1		1,2,3,4,5,6,7, 8,9,10,11	
3	JE 2		12 to 15 & Mariani Circle villages	
4	JE 3		16,17,18,19 & Teok Circle villages	

ESF 2 - Rapid Assessment Team (RAT)

Sl. No.	Particulars	Contact no.	Area	Remarks
1	Research Assisstant		Technical Supervisor will give necessary direction for field visit	The officials will assess the ground situation and assist / report to concern DAMT officials and report to control room
2	Mohurrir			
3	Investigator			
4	Driver			
5	Peon			

ESF 3 - Control Room Setup & Logistics

Sl No.	Particulars	Remarks
1.	UD Asstt (CONTROL ROOM INCHARGE)	T&CP 1 T&CP 2 T&CP 3
2.	Research Asstt. (DATA COMPILATION & DAILY SITREP TO HEAD & CONCERN OFFICES)	1 Draftsman Gr-I 2. DM Gr -II. 3. Investigator.
3.	JE 3 (LOGISTIC & SAFETY / SECURITY OF OFFICIALS)	Investigator, T&CP Gr-IV Gr-IV

Equipments

Sl.No	Particulars	Contact No	Equipments	
1.	Asst. Ex. Engineer Jorhat Municipal Board Rajesh Borah, Supervisor, Jorhat Municipal Board		Compactor: Excavator: Tractor & Trailer: Dumper Placer: Mini Loader:	3 No. 1 No 5 Nos. 2 Nos. 1 No.
2.	Contractor, Charigaon, Jorhat.		JCB: Dumper:	3 Nos. 6 Nos.
3.	Contractor, Club Road, Jorhat.		JCB: Dumper:	1 Nos. 3 Nos.

ANNEXURE II**1. Functional organization structure**

- i. Department of Housing and Urban Affairs at State Govt.
- ii. Director, T&CP, Dispur, Guwahati-6.
- iii. Deputy Director, T&CP, Jorhat.

2. Inventory of departmental resources:

- i. Resource: Department provide technical support.
- ii. Capacity: Officials to be trained for earthquake engineering & Rapid Visual Screening etc.
- iii. Location: Town & Country Planning, Unnayan Bhawan, PO - Jorhat, Pin-785001

3. Details of officers at State & District level:

- i. Director, T&CP, Dispur, Guwahati. Phone: 0361- 226154094350-45168
- ii. Deputy Director, T&CP, Jorhat.

4. Special decision-making procedure: As per SOP.**5. Details of budget provision: Budget provision is a must for successful implementation of SOP. Necessary direction to be received from Head office regarding such provision related to Disaster.****Details of departmental officials**

SL. NO.	NAME	DESIGNATION	MOBILE NO.
1.		Deputy Director	
2.		Asstt. Engineer	
3.		U. D. Asstt.	
4.		L. D. Asstt.	
5.		L. D. Asstt	
6.		L. D. Asstt	
7.		Junior Engineer	
8.		Junior Engineer	
9.		Junior Engineer	
10.		Draftsman Gr.-I	
11.		Draftsman Gr.-II	
12.		Draftsman Gr.-II	
13.		Research Asstt.	
14.		Tracer	
15.		Duftry	
16.		Khalashi	
17.		Khalashi	
18.		Khalashi	
19.		Chowkider	

ANNEXURE III**1. Check list for damage assessment**

- i. Geographical area impacted
- ii. Structural damage to buildings etc.
- iii. Damage to roads and bridges, public buildings shops, workshops, stalls etc.
- iv. Damage to water supply lines, electricity supply lines, public utilities etc.

2. Tools for rapid assessment

- i. Photographs, video graph/film of the affected area
- ii. Field Report

Sl. No	No. of Buildings / infrastructure affected	Location	Action Taken	Remarks/ Any SOS to Control Room
Name: Sign: Date: <i>*Note: SOS related to Life trap, Emergency Medical support, Rescue etc.</i>				

- iii. Report from Administration/ ULBs/ Media etc.
- iv. Rapid Visual Screening (RVS) Survey
- v. Mapping of affected area / buildings / infrastructure
- vi. Safety Gear for officials.

ANNEXURE IV**1. Rapid Visual Screening of Indian Buildings for Potential Seismic hazards
in *Seismic Zone V***

Building Name
Use
Address

PHOTOGRAPH

2. Plan to Scale

3. Building Details

OCCUPANCY		SITE	FALLING HAZARDS
1. Residential, Ord/Imp. School	Max. Number of Person	High W.T. (within 8m) _____	Chimneys <input type="checkbox"/> Cladding <input type="checkbox"/>
2. Health Assemble Office	0-10 10-50 51-100 > 100	Liquefiable (if sandy soil)	Parapets <input type="checkbox"/> Other <input type="checkbox"/>
3. Commercial Historic	Residents _____	Land Slide Prone	
4. Emer. Service Industrial	Floating _____		

4. Probable maximum Grade of Damage

Building Type	Masonry Building				RC or steel Frame Building				URM infill	Wood
	A, A+	B, B+	C, C+	D	C, C+	D	E, E+	F		
Damage Grade in Zone V	G 5	G 5	G 4	G3	G4	G3	G2	G1	G4	G4

**Note: + sign indicate higher strength hence somewhat lower damage expected than that stated. Also, Average damage in one building type in the area may be lower by one grade point than the probable maximum indicated. Surveyor will identify the Building Type, encircle it, also the corresponding damage grade and tick mark the recommendation.*

5. Recommended Action

- i. A, A+ or B, B+: Evaluate in detail for need reconstruction or possible retrofitting to achieve type C or D
- ii. C, C+: Evaluate in detail for need of retrofitting to achieve type D
- iii. URM infill: evaluate for need of reconstruction or possible retrofitting to level D
- iv. Wood: evaluate in detail for retrofitting

Surveyor's Signature _____

Name _____

Date _____

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